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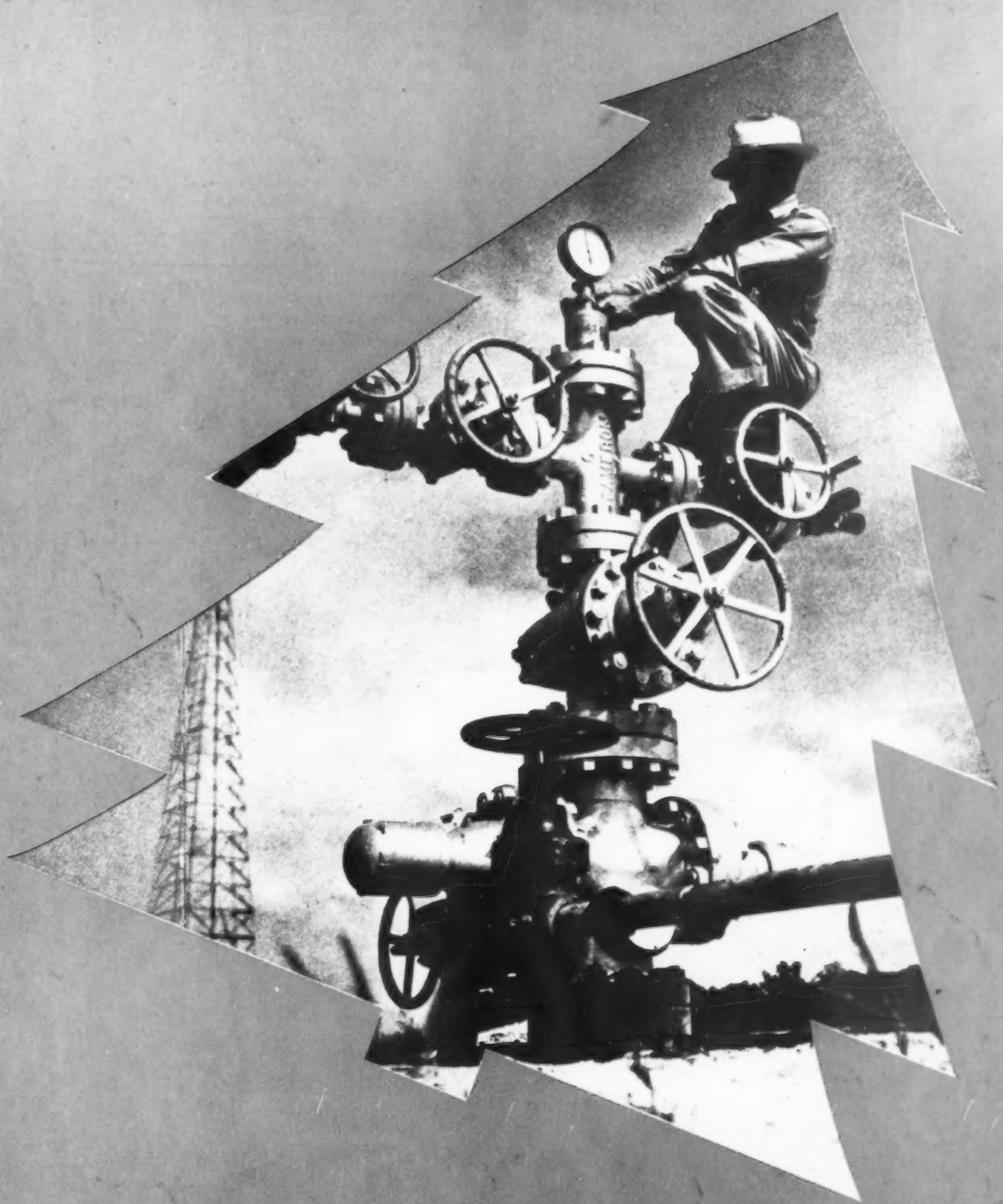

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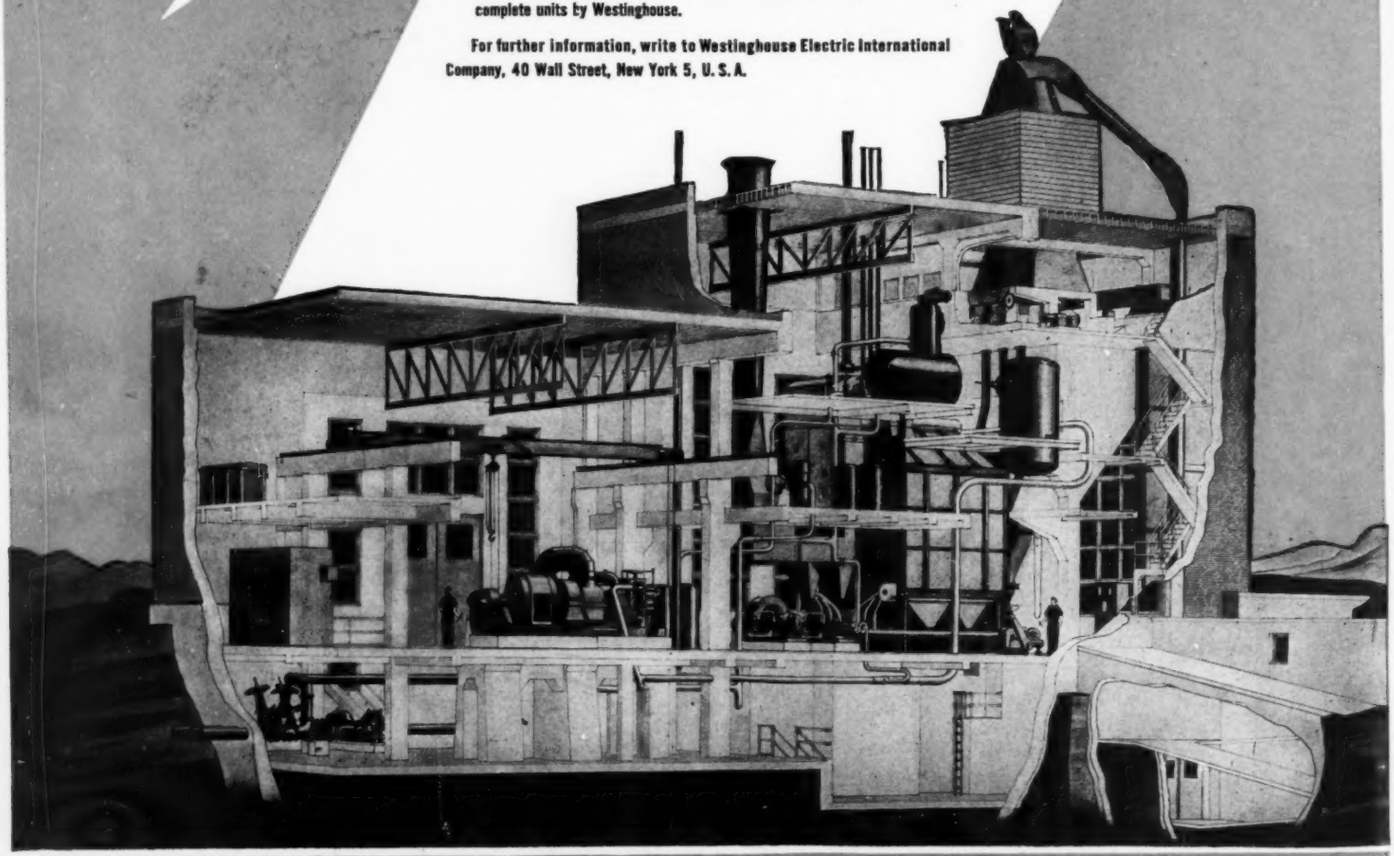

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EDITORIAL

AMERICA'S PLACE IN INTERNATIONAL OIL

THE report prepared by representatives of virtually all the American oil companies engaged in operations abroad for the information of the Special Senate Committee Investigating Petroleum Resources presents a very complete survey of the international oil situation as to the division among various nations of the ownership of present and potential production, the share of each in refining facilities and their relative marketing positions. It reveals that the enterprise of American companies and their investment of $2.5 billion has given the United States a position of practical equality with British-Dutch interests in the international field as a whole, the Americans being a preponderant factor in South America but occupying a minor place in the Middle and Far East. Reserves outside the United States under control of American companies amount to 17.4 billion barrels, approximately the same amount as that controlled by British-Dutch interests.

Factors in foreign oil development that seldom receive adequate attention in popular discussion of the subject are brought out by the report. These are the heavy investment required by these operations and the greater degree of risk involved as compared with similar undertakings in the domestic field. Instances are cited in which the search for oil has required the expenditure by individual companies of from $30,000,000 to $60,000,000 before commercial production was attained and of others in which outlays of many millions brought no return whatever. Losses arising from failure to locate substantial production are those which apply to oil search everywhere though failure in the foreign field is more costly. Other losses incurred by companies operating in foreign fields have come through political instability of governments, from exorbitant taxation or from the confiscation of properties legally acquired and developed. During the recent war years the damage sustained from such causes has been multiplied through the destruction in the course of military operations of installations in which hundreds of millions of capital were invested. Such reparation as may be received will fall far short of the real value of the lost properties either because of political conditions or because governments of the areas affected do not have the means to repair the damage or to pay for it.

Prior to World War I, the interest of American oil companies in extending their operations beyond the borders of their own country was confined chiefly to finding markets for products which were in excess of home requirements. The only large foreign investment in production and refining was in Mexico where not only oil but many other industries were being developed by capital and enterprise from the United States. Following that war the country indulged in one of its periodic scares over the early exhaustion of its petroleum resources. Known reserves were sufficient for only about a dozen years and the rapid increase in the use of motor cars made the problem of finding adequate supplies of liquid fuel apparently one of national concern.

Under these circumstances the federal government encouraged American oil men to enter foreign fields and to engage in production in such areas in order to supplement the threatened shortage of the domestic output. The right of Americans to participate on equal terms with other nationals in the development of oil resources was established through vigorous representations by the Department of State in the case of Iraq and by an agreement with the Netherlands which permitted entry into the Dutch East Indies. The superiority of American equipment and the skill of its operators in finding oil caused them to be warmly welcomed in countries of both hemispheres that were interested in the utilization of their petroleum resources. The early twenties were marked by a very rapid expansion of activities in many parts of the world which led to American operation of roundly half of all foreign production.

In the meantime, the discovery of a succession of large fields in the United States changed the domestic picture completely and by the early thirties the oil problem of the United States had become one of coping with a plethora of production. With the advent of the New Deal official attention was concentrated on the regulation of domestic affairs and American companies operating abroad no longer were able to count upon the backing or even the sympathetic interest of their own government if their rights or their properties were attacked. The proportionate share of American companies declined from over 50 percent in 1922 to less than 40 percent in 1941.

Now the cycle has completed a full turn. With the prospect of greater dependence upon petroleum imports the government is again prepared to encourage American participation in oil operations in foreign fields and to defend the legal rights of its citizens engaged in such developments. A serious effort is being made to establish an enduring national oil policy and in the formulation of such a policy the report recently completed, embodying as it does the past experience of American companies in the international field and the best thought of those who have engaged in international operations, should be a valuable guide.

NEW VENEZUELAN ADMINISTRATION REASSURES OIL INTERESTS

By Ruth Sheldon

IN March, 1943, upon the passing of the new Venezuelan oil law, hailed internationally as a model of progressive and equitable oil legislation and proof that disputes between governments and foreign oil companies could be solved in orderly fashion by the conference method, the then President of Venezuela, General Isaias Medina A. declared, "I am one of those who believe that foreign capital should be attracted to the country, and that once in it, its investment should be guaranteed so as to provide reasonable benefits for both the nation and the investor. . . . The law is in fact a just and equitable one whereby the peaceful development of the companies' industrial and commercial activities will be protected by the institutions of a Republic of free men who know how to keep their word".

American and British oil men who operate the oil fields of the world's second largest producing country, had ample cause to recall those words this October when with the suddenness of a tropical afternoon rain storm a revolution swept over Venezuela and President Medina was removed and imprisoned by a Democratic Action party. Cause for sober alarm was the fact that the leaders of this party had strenuously opposed the terms of the new oil law at the time of its adoption claiming it to be "inequitable".

To date, the revolutionary provisional government is giving assurance by word and deed that the description of "the institutions of a Republic of free men who know how to keep their word," is that of the Venezuelan people and not just that of a transitory official spokesman.

The new Minister of Fomento, Dr. Juan Pablo Perez Alfonso, whose Ministry is in charge of oil development, has officially announced that the 1943 oil law and contracts made under it will be respected; that the present provisional government does not contemplate any change in the law; and that it will limit itself only to determining whether or not federal royalty revenues were being honestly calculated.

The Department of State of the United States considered this and similar policy announcements affecting other phases of investment and international relations a vindication of its action in recognizing of the revolutionary provisional government only twelve days after its assumed power. A State Department official pointed out that although such rapid recognition might seem overhasty, it was, in fact, carefully considered and the Department reached its decision only after being convinced that the new provisional government is actually a democratic one.

Official Washington is optimistic about the Venezuelan political situation and does not anticipate further disorder or any results prejudicial to American investments, business or foreign relations with Venezuela. The general feeling among oil men with direct interests in Venezuela is also optimistic. However, both groups are cautiously and carefully watching all developments as the possibility of trouble is inherent in the revolutionary method itself.

Although Venezuela has had many revolutions, this one is unique and of particular significance for it had been generally conceded by the world at large that Venezuela's revolutionary days were over and that Venezuela was the most politically stable country in South America. In 1935, upon the death of General Juan Vicente Gomez, the last of a century of Venezuelan despots and dictators, the country passed with remarkable peacefulness into an era of democracy under the guidance of an elected President, General E. Lopez Contreras. When his presidency ended in 1941 and General Medina was peacefully elected while the democratic reforms of General Lopez Contreras' administration were retained and additional ones inaugurated, Venezuela's democratic leadership in Latin America was established. Due to its oil wealth, the country had developed even under the Gomez regime, into the most financially stable nation in South America and when the differences between the government and the oil companies were peacefully and democratically composed in 1943, resulting in increased revenue for the country and an increased feeling of security for the oil companies, it was generally believed that its political stability was equally well established.

The outbreak of trouble came as a surprise to statesmen and business alike. Nor did this indicate a lack of information or interpretative ability on the part of either. In view of Venezuela's past ten year record, of its favorable financial situation, of the fact that the campaign for next April's presidential elections was on, of the fact that the war had just ended during which Venezuela suffered comparatively little, it would have been impossible to predict that the vocal expressions of the discontent with the high cost of living, the Army promotional system and some of the activities of the administration were abnormal or indicative of anything other than the usual opening pyrotechnics of a heated political campaign.

Under these circumstances the changing of administration with bullets rather than ballots gave rise to great alarm that the revolt was inspired by radical elements taking advantage of general world unrest and inflammatory conditions to set up fascist, communistic or definitely undermocratic control. Now that the excitement has died down it has become apparent that such is far from the actuality. Regrettable as the method may be, the upheaval seems to have been undertaken by the insurgents in the belief that it was the only way to permit the forthcoming election to freely express the will of the people.

In order to understand this seeming inconsistency, it must be realized that Venezuelans do not have a direct vote for the President, who is elected by Congress. Until a constitutional amendment this year the deputies to Congress were not elected directly but were elected by assemblies of the municipalities of each state. There is no universal woman suffrage, although another constitutional amendment this year gave women the right to vote in election of municipal councils. The presidents of the various states are not elected but appointed by the federal president. These various restrictions on the elective powers of the people have made it possible for a party machine to gain and keep control with considerable ease.

The Democratic Action party, instigators of the revolt with the support of the younger Army officers, were apparently afraid that these controls would be exercised by the administration to the exclusion of any other candidate, no matter how representative of the popular wish he might be. The new provisional government has already announced plans to hold a constitutional assembly to frame a new constitution guaranteeing direct popular and secret vote for Presidency, Congressional and state offices, functioning of all political parties within their constitutional rights, and universal suffrage. Nor will any members of the present provisional government run for office. They plan to expedite matters so that the new national elections can be held at the customary time next April.

In addition to this incentive for revolt, the Democratic Action party has alleged the existence of graft in high places. It not only announced that it would bring deposed government officials to trial on this charge, but also all those of administrations dating back fifty years and accordingly it froze the bank accounts of all such individuals who had balances of more than $30,000.

There were no anti-foreign, anti-oil demonstrations during the few days of revolutionary hostilities. On the contrary, the provisional president and leader of the Democratic Action party, Dr. Romulo Betancourt, made every effort to reassure the American government and American business interests that the new administration would respect all the former administration's commitments to them and was anxious to further cultivate and strengthen cooperation and good will.

Some apprehension had been felt in business circles as President Betancourt in his capacity, as editor of the Democratic Action newspaper El Pais had strongly attacked the 1943 oil law. However, immediately following the organization of the provisional government he called Arthur Proudfitt, president of Creole Petroleum Company (Standard Oil of New Jersey subsidiary), John Loudon, general manager of Caribbean Petroleum Company (Royal Dutch Shell subsidiary) and J. W. Bradbury, manager of Mene Grande Oil Co. (Gulf subsidiary) to meet with him and with Minister of Fomento Perez Alfonso and Minister of Labor Raul Leoni.

President Betancourt assured the oil men that the provisional government did not contemplate any change in the 1943 oil law but wished to determine whether or not it was equitable. This in itself was not entirely reassuring for the question of the equitability of the new law was thoroughly threshed out during its formulation and its operation has shown that oil profits are approximately equally divided between government and industry. However, the oil industry representatives were satisfied that President Betancourt was not antagonistic to the oil interests and the plans of the provisional government were subsequently more specifically stated in the policy statement of Minister of Fomento Perez Alfonso.

This statement limited the government's purpose to determining whether government royalties are honestly calculated—a point which gives no cause for worry for the oil companies as in some cases government royalty figured according to formula brings the government more for its royalty oil than the companies receive from its actual sale.

Minister Perez Alfonso explained the Democratic Action party's former opposition to the oil law as due to their belief that profits could have been more equitably divided and the profit percentage for both parties stabilized by not making them subject to world market price fluctuation. As he also stated that all technical personnel of the Ministry was being retained, the new administration will have ample opportunity to obtain competent advice on the equitability of the new law. This technical personnel, which is without equal in any other South American government, is a veteran of all the oil law conferences and is well equipped to interpret the technical bases of the law to the new administration.

The Minister further assured oil men that the present government has no intention of nationalizing the industry nor of expropriating properties.

Emphasis was placed on this policy when President Betancourt announced, that "we will respect all interests without discrimination as to their nature or country of origin. An equitable defense of our economy can be reconciled perfectly with the recognition that a country that depends on foreign investments needs to maintain an atmosphere of security for production activities."

The purpose of having the Minister of Labor present at the meeting with the oil men was to discuss the effect of the change on labor policies. A national meeting of petroleum unions had already been scheduled before the revolt and the provisional government wished to make clear that it was interested in the determination of equitable wage scales. Both the oil men and the new government members were satisfied with the spirit in which each approached the labor convention. To date the meetings have justified that satisfaction and there is no apparent trouble in view.

If the government continues to speak and act as it has heretofore, it is felt that the change, to quote a qualified American observer, "may be a justifiable part in the struggle of the people to better their conditions." However, the burden of the proof lies on the provisional government and the extent to which it can and will carry out its announced aims.

Upon its treatment of the oil industry now and in the future depends to a large degree not only its own fate but that of the country. Venezuela is completely dependent upon its oil economy and it will be many years before it can develop its agriculture and industry to the extent where they could take the place of oil. The present royalty and tax burden on Venezuelan oil is such that if it were increased it is probable that Venezuela would be unable to compete on the world market, for example, with oil from the Middle East.

E. DeGoyler, the eminent economic geologist, in his official survey of the Middle East, voiced the conclusion that "The center of gravity of world oil production is shifting from the Gulf-Caribbean area to the Middle East — to the Persian Gulf area—and is likely to continue to shift until it is firmly established in that area." Any artificial speeding of this shift would be a crippling blow to Venezuela.

At present the Middle East has a far less important share of the world market than Venezuela and has seen far less development and exploration, but in spite of this it has approximately four times the proven reserves and has cheaper production costs. Once the Middle East gains ascendancy in the world market Venezuela will never be able to regain its present position as the world's largest exporter of oil. As a matter of fact, Venezuela's prime consideration should be to encourage and stimulate oil development on such favorable conditions as will make it possible for her to maintain her competitive world position regardless of the extent of other countries' reserves.

The new administration will also be faced with the problem of a probable decrease in production, for Venezuela's production of almost a million barrels daily has been the result of abnormal war conditions. It is likely that production may have to be cut back to a half million barrels daily or some such figure until such time as world conditions permit a renewal of expansion.

The provisional government has already increased government salaries by 25 percent and announced that it plans to decrease import duties to lower the cost of living. This increase in expenditure plus cuts in revenue, both by the government and by slackening off in crude demand, could conceivably tempt the government to consider upping oil royalties and taxes as a revenue source. The government might point out that the law requires 16-2/3 percent royalty but that in bidding for new concessions under the law various companies, with the exception of Jersey and Shell, offered and accepted royalties up to as high as 33-1/3 percent. This was done, however, because the law also provides that the government may reduce royalty rates in cases where, due to increased production costs including taxes, it is no longer possible to produce the oil economically. In one such instance royalty rates have been reduced. The companies would never have offered such high royalty rates for new concessions without the confidence that inequalities would be adjusted over the long range production picture.

If the government is fully apprised of the competitive world oil situation as already briefly outlined, it is doubtful that it will consider increasing oil royalties or taxes. As a matter of fact, the Treasury balance is almost $100,000,000 which is ample for any new public development program which could reasonably be expected to be carried out.

In the meantime, until additional proof of the policy of the present administration is offered, development of Venezuelan projects, oil or otherwise, may be considerably slowed down. For example, a group of independent California oil companies were interested in the possibilities of entering Venezuela oil development as a combined unit to permit large scale operations. Encouragement of additional companies to enter Venezuela has been an established Venezuelan policy. The California companies sent an engineer to survey the situation and he returned only three months ago recommending the project unreservedly. In his report the first reason which he gave for favoring the project was because the country was so "politically stable". The recent events have brought the companies' plans to a halt and they, together with others, who were planning investments in the country, will wait on further evidence that this revolution was in fact a democratic one which will encourage the peaceable development of foreign investment.

President Betancourt is an attorney and editor who has been a leader of what might be called the Venezuelan "intelligensia". He is not a com-

(*Continued on page* 94)

B. Brewster Jennings, Group Chairman

AMERICA'S STAKE IN THE WORLD OIL INDUSTRY

Report of a Group Representing 93 Percent of All United States Activities Abroad Presents a Complete Survey of the Development and Demonstrates its Importance to the National Economy and to the Countries in which Operations are Conducted.

COMPANIES representing 93 percent of the total United States investment in oil properties outside the country have presented before the Special Senate Committee Investigating Petroleum Resources an elaborate survey of the extent, location and nature of these holdings and of the operations conducted in connection with them. The report fills 670 typewritten pages and undoubtedly is the most complete assemblage of data ever collected on the subject. It reveals in striking fashion the tremendous stake of American interests in oil development in other parts of the world and the vital importance to the national economy of maintaining its position.

The group acting for these companies includes: B. Brewster Jennings, president, Socony- Vacuum Oil Co., chairman; R. H. Colley, president, The Atlantic Refining Co.; H. D. Collier, president, Standard Oil Co. of California; J. Frank Drake, president, Gulf Oil Corp.; George A. Hill, Jr., president, Houston Oil Co. of Texas; Eugene Holman, president, Standard Oil Co. (New Jersey); W. Alton Jones, president, Cities Service Co.; Don R. Knowlton, manager foreign department, Phillips Petroleum Co.; W. S. S. Rodgers, chairman of the board, The Texas Co.; Reese H. Taylor, president, Union Oil Co. of California; A. E. Watts, executive vice-president, Sinclair Oil Corp.; Leonard M. Fanning, secretary.

With $2.5 billion of funds invested in operations outside the United States the oil industry ranks third in American investments abroad, being exceeded only by general manufacturing and by public utilities and transportation. If the two latter were separated, petroleum would stand second. The accumulative amount invested at the end of 1944 shows a grand total of assets employed of nearly $3.2 billion; net assets of $2.2 billion and net worth of $1.7 billion. During the period 1919-1939 the amount employed in developments outside the boundaries of the country rose by more than $2 billion or $100,000,000 per year.

Of the total investment at the end of 1939 approximately 35 percent was devoted to exploration and production, 31 percent to marketing, 15 percent to refining, six percent to transportation and 13 percent to all other purposes. Assets employed in exploration and production at the beginning of the war were largely concentrated in countries of South America, amounting to $736,000,000 or 83 percent of the total for all foreign countries. Until 1938 the investment in marketing facilities was greater than that in production, but beginning with that year exploration and production took first place. Refining in South America accounted for over $133,000,000 or 36 percent of the total invested abroad in this branch of the industry. Transportation engaged over $51,000,000 or 35 percent of the entire investment in this category.

While the preponderance of investments in the production and distribution of petroleum was in Latin America, 53 percent or $420,000,000 of the capital assigned to marketing was employed in Europe and Africa. Capital employed in Europe immediately preceding the war included $71,000,000 in the United Kingdom, $57,000,000 in Germany and $35,000,000 in Italy. Investments in the Middle East, Netherlands India, China and Canada accounted for most of the remainder of foreign operations. Twenty-two American companies are listed as having substantial holdings abroad. The financial costs and the hazards involved are such as to deter all except the largest and strongest concerns from venturing into foreign fields. Many other companies, however, make and sell prod-

Left: Bahrein Refinery, Persion Gulf (Texas Company—Standard Oil Company of California).

Towers of Raffineria di Napoli (Socony-Vacuum).

Above: Partial View of Aruba Plant of Standard Oil Co. (N. J.) Largest American Owned Refinery Outside U. S.

ucts for distribution, outside the country without having any large investment abroad. They sell through agencies operating in the various countries or sell to large consumers direct.

In the early days of the world oil industry, when foreign output was centered in countries of the Eastern Hemisphere, crude oil production in these areas was dominated by British-Dutch and Russian nationals. American capital entered outside fields in the late nineteen hundreds but it was not until after the turn of the century that it engaged in large scale operations in Romania and Mexico.

World War I changed the picture materially with the development of large volume production in the Western Hemisphere. Mexico's development was rapid and by 1921 production reached 550,000 b/d, which remained a record for countries other than the United States until 1937 when Russia's output exceeded it. Well beyond 70 percent of the Mexican industry was United States-owned and as a result this country's share of all foreign production rose from 15 percent in 1915 to over 50 percent in 1921 and 1922, alltime peaks for the American share of foreign production.

British-Dutch nationals increased the volume of their production steadily despite loss of their Russian properties shortly after the end of the war. These nationals actively participated in Western Hemisphere developments but their share of production was not great enough to enable them to maintain the position developed by the end of World War I.

By the end of the period 1912-1922, Americans had begun producing operations in Peru, Netherlands East India, Venezuela, Colombia, Canada and Poland; had rehabilitated Romanian fields and raised Mexican output to peak levels. British-Dutch nationals owned oil production in Mexico, Venezuela, Ecuador, Trinidad, Canada, Argentina, Peru, Romania, Egypt, India, Burma, Netherlands East India, British Borneo and Iran. Their Russian properties were confiscated in 1919.

Subsequent to 1922, declines in Mexico, while Russian, Romanian and Iranian production rose, reduced American participation in foreign output to 23 percent by 1931. Despite the emergence of Venezuela as a major producer during this period, American production there did not offset the losses in output from Mexican wells and the United-States-owned percentage remained at 23 to 26 percent until 1940. It then rose to 27 percent in 1941 when British-Dutch production in Iran and Iraq was partially shut in, dropped to 19 and 20 percent in 1942 and 1943, respectively, while Venezuela was partially shut in, then rebounded to 27 percent in 1944 when Venezuela produced 702,000 b/d, a foreign record up to that time.

Russian participation in foreign production rose from a low of 9.6 percent in 1921 during the next decade and then leveled off at 28 to 31 percent.

British-Dutch interests, controlling 29 percent of the production in 1912, 40 percent in 1918 and 31 percent in 1922, rose to 41 percent in 1929 because of increases in Iran, Venezuela, Netherlands East India and Mexico, while other established British-Dutch production also increased somewhat. British-Dutch participation declined again thereafter in percentage and at the outbreak of World War II in 1939 was about 36 percent, one of the principal reasons being the loss of properties in Mexico.

Wartime shutting in of Iran and Iraq and the loss of East Indies and Romanian properties to the Axis further lowered the Anglo-Dutch position to 27 percent in 1943 but re-opening of Middle East wells to record levels raised the position to 29 percent in 1944. This was practically equivalent to the Russian position and was slightly higher than the 27 percent owned by American nationals.

The three national groups, then, shared almost equally in foreign crude oil production during 1944. From World War I, their aggregate ownership of foreign production was more than 90 percent until 1938 when the Mexican government expropriated British-Dutch and American properties. The seizure of oil fields by Axis armies during the recent conflict further reduced the aggregate participation to an estimated 78 percent in 1943 but in 1944 it rose again to nearly 85 percent — also partially estimated.

It should be noted, however, that for about a decade, Russian oil has played only a minor role in international trade, and foreign consumers outside of Russia have been dependent primarily upon Anglo-Dutch and American nationals for the bulk of their oil supplies.

On January 1, 1945, it was estimated that the reserves in the Western Hemisphere (excluding U. S.) totaled 8.9 billion barrels or about 21 percent of the total foreign reserve including

Russia and about 24 percent of the total foreign excluding Russia. Although the American share, amounting to 5.8 billion barrels in the Western Hemisphere, is about six billion barrels lower than the quantity owned in the Eastern Hemisphere, it is in the Western Hemisphere that the American position is most dominant. Americans owned 65 percent of the Western Hemisphere reserve as against 24 percent for the British-Dutch group of companies and 11 percent for all other companies. This major position in the Western Hemisphere is brought about by the ownership of 5.6 billion barrels by American companies in the Caribbean area (Venezuela, Colombia, and Trinidad) or 72 percent of the total reserves in that sector. The British and Dutch companies own a little over two billion barrels of reserves in the Western Hemisphere or 24 percent of the total. The reserves of the British-Dutch companies are also concentrated in the Caribbean area and their share of ownership in that region amounts to 25 percent.

In the Eastern Hemisphere, exclusive of Russia, the American companies owned reserves totalling 11.6 billion barrels, a 40 percent share. The British-Dutch group owned 15 billion barrels or nearly 53 percent of the total reserves in the Eastern Hemisphere and all other companies owned about two million barrels or seven percent of the total reserve.

The Near and Middle East combination of countries contained a proved reserve of 26.8 billion barrels or about 70 percent of the total foreign reserve outside of Russia. It is in this region that about 70 percent of the American foreign-owned reserve is located, the total American-owned reserve amounting to 11.1 billion barrels or nearly 42 percent of the total reserve of the Near and Middle East. The British-Dutch interests also have the highest concentration of reserves in the Near and Middle East amounting to 14 billion barrels or 52 percent of the region.

The magnitude of the reserves in the Near and Middle East dwarfs the reserves in all other regions of that hemisphere. In Europe, excluding Russia, Americans own 168 million barrels or about 27 percent of the total. The British-Dutch group have about the same quantity and proportionate share. In East and South Asia (excluding Sakhalin which is included with Russia) the Americans have no crude reserves, whereas the British-Dutch group has 167 million barrels or 82 percent. The remainder — 36 million barrels — was owned by the Japanese. In Oceania, American companies possessed a reserve totalling 275 million barrels or 29 percent of the area total. The British-Dutch group owned 675 million barrels or 71 percent. The Soviet Government in Europe and Sakhalin had a reserve of 5.7 billion barrels at the beginning of 1945. No other outside interests operate in these areas.

The total foreign reserve of American companies amounted to 17.4 billion barrels on January 1. The reserves of the British-Dutch group totaled 17.3 billion barrels. If Russia is included, the position of the American and Dutch group is about 40 percent each. The remaining 20 percent or 8.7 billion barrels is owned by all other foreign interests. Included in this group is the government company operated reserves in Argentina, Bolivia, Mexico and Russia, amounting to 6.5 billion barrels or nearly 75 percent of the "others" classification.

From about 1880 to World War I, American companies engaged, to a minor degree, in the construction and operation of refinery facilities in several foreign countries. During the period between 1918 and 1939, American companies made further substantial expenditures for refinery facilities in Argentina, Venezuela, Peru, Netherlands West Indies, Colombia, Mexico, France, Germany, Poland, Romania, Italy Netherlands East India, and to a lesser extent in several smaller countries.

Starting with the year 1927, it is estimated that foreign refineries ran 750,000 b/d, of which American-owned plants accounted for 142,800 b/d or approximately 19 percent. By 1939, the American share in foreign refinery runs had increased to 23 percent of total foreign and 31 percent of the total excluding Russia.

There are 66 American-owned refineries in foreign countries having an estimated capacity of 873,495 b/d. Of these 26 with a capacity of 594,560 b/d or 68 percent of total capacity are located at or near crude oil producing areas, and 40 with a capacity of 278, 935 b/d or 32 percent were distant from crude production and erected to run largely on imported crude oil.

Some of these refineries were economically justified because of the existence of indigenous production or nearby sources of supply. Other refineries were not economically sound and could operate profitably only with such artificial protection as high customs duties on finished products, import restrictions, exchange controls and licensing procedures. In constructing these refineries the oil companies, in most instances, were not free agents but were obliged to conform with those policies which foreign governments considered to be in the national interest.

Where refineries are built in accordance with sound economic principles, certain advantages may be realized. However, where refinery construction is based on political, military or national consideration only, economic factors are usually ignored. The operation of such units often results in higher costs to the consumer, consequent restriction in demand and unbalanced output that is out of line with internal consumption.

The transportation of oil and gas by pipe line in foreign fields has been confined largely to the carrying of crude oil from field to export terminal, and is generally considered as a producing facility. Typical American ingenuity and engineering skill have been employed in the building of some of the lines through tropical jungles, over deserts and high mountains. Unlike the oil pipe lines in the United States which form a vast network comparable to transcontinental railroad systems, the lines in foreign

Below: Palembang Refinery of Standard-Vacuum Oil Company, Sumatra, D.E.I. Erected at a Cost of $30,000,000.

Right: Petrolea Camp on the Barco Concession, Colombia, S.A. (Texas Company—Socony Vacuum).

countries are few and more or less isolated and self-contained units.

The principal pipe line systems abroad owned by American oil companies or in which they have an interest are: In Venezuela, the lines from Mulata-Jusepin-Quiriquire to Caripito; Officina to Puerto la Cruz, and from Santa Barbara to Puerto la Cruz; in Colombia, the lines from the De Mares Concession to Cartegena, and from the Barco Concession to Covenas; and in the Middle East, the line from the Kirkuk field in Iraq to Haifa and Tripoli, in which American companies have a 23¾ percent interest; also, in the Far East, the line from the Talang Akar area to Palembang in the Netherlands East Indies.

American oil companies were pioneers in marketing petroleum products in virtually all countries of the world. The relative position of U. S. exports to total foreign demand fell off gradually from 80 percent in the 1870s to 19 percent in 1903, rising again during World War I to nearly 39 percent in 1918. Although there has been greatly increased consumption of petroleum and products in foreign countries and total exports from the United States have mounted, the percentage relationship of American exports to total indicated foreign demand has declined sharply in the past 20 years from 32.6 percent average 1920-1929 to 19.6 percent average 1930-1939. The declining relationship reflects the increased competition from foreign producing and refining sources.

Since that year the trend in relationship has been downward, reaching the pre-war low point of 17 percent in 1936. Exports exclusive of U. S. Army and Navy shipments fell off again after 1938 due to the blockade of Axis countries, and to restricted exports for civilian requirements in neutral and allied countries. With the development of production abroad by American companies, however, the major proportion of which has been marketed abroad, American companies were able to supplement U. S. exports and it is estimated that in 1938 American-owned oil entering foreign markets amounted to 44 percent of total foreign requirements, excluding Russia.

American participation in world oil markets is vitally important from the standpoint of the continued activity of American oil companies in developing oil production and reserves in foreign countries, the latter considered by the State Department and the Army and Navy to be vital to national defense and to the preservation of world peace.

Obviously, American-owned oil production and reserve cannot be properly developed unless there is at the same time a natural outlet for such production in the world oil markets. While foreign consumption in total is less than in the United States, it was increasing at a rate almost double the rate of growth in the United States prior to the war. Some indication of great potential demand abroad is possible from the fact that U. S. consumption is at the rate of nine barrels per capita whereas the consumption of the remainder of the world is at the rate of only one-half barrel per capita.

The initial expense of developing crude oil in commercial quantities in foreign fields and the cost and time involved in delivering such oil to the nearest point of ocean shipment is so great that usually individual or small capital cannot afford the risk.

Often heavy initial expenditures have to be made in foreign countries far out of proportion to those necessary for starting work in the relatively accessible fields of the United States. The mere embarking on the undertaking by investing in a concession or lease usually involves commitments far in excess of the first expenditure.

Usually these commitments are made in connection with the development program to be undertaken within a time specified either by the local law or company program or both. Almost invariably, large volumes of capital are required to meet these initial investment costs. For instance, in the case of one company in Venezuela it was nearly 15 years after the initial investment had been made, that there was delivered on board tanker the first barrel of crude at an over-all cost to that date of 44 millions of dollars. Another example is that of the development of the Barco concession in Colombia originally acquired by American interests in 1916. Finally, when the first barrel of Barco oil was delivered on board tanker in 1939 it was found the American owners of that property had expended a total of 60 millions of dollars.

Many leases and concessions upon which considerable money is expended for exploration and development do not pay out at all. The report gives examples involving losses from about $100,000 to nearly $9,000,000.

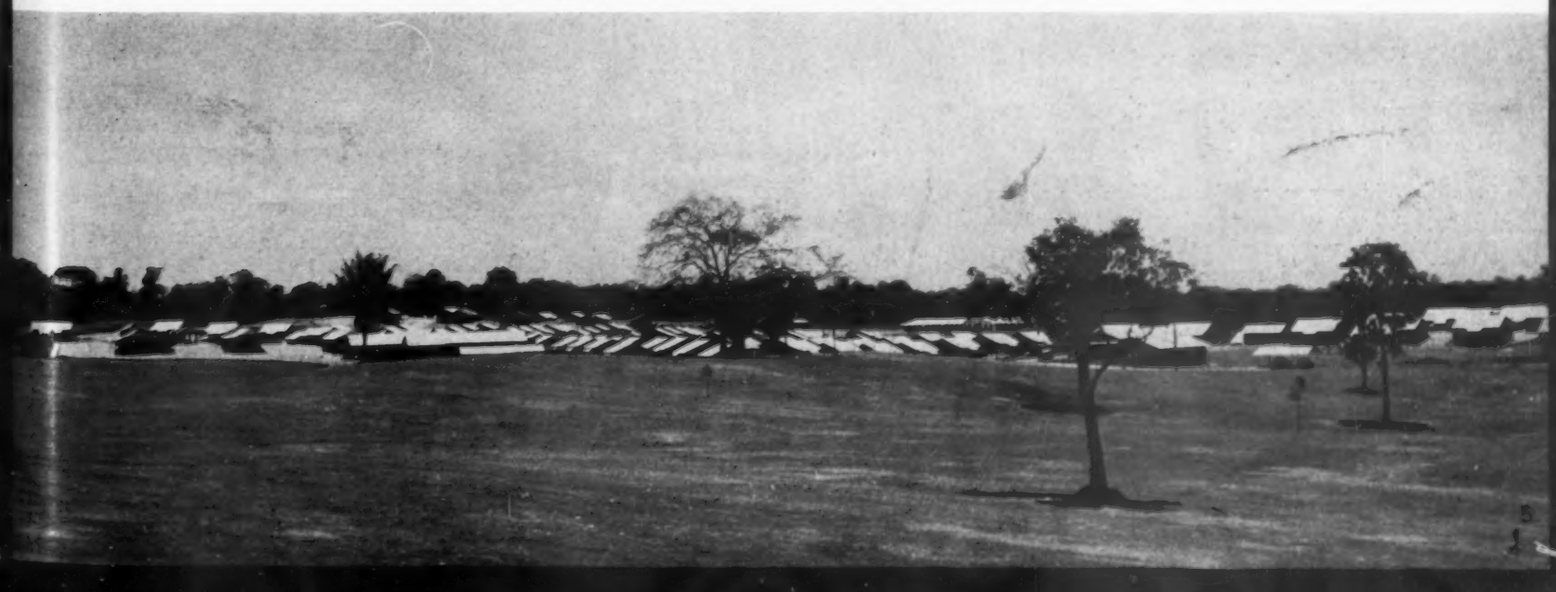
Many American oil companies lost heavily on their investments in Mexico during World War I and in the early 20's when Mexican producing fields went to salt water. Some pioneer companies, however, were on the right side of the ledger and made substantial profits from their ventures. Refineries were built at millions of expense, and some were never operated or were closed six months after completion. Pipe lines were laid that did not transport enough oil to properly lubricate them. One oil company purchased a railroad for both freight and passenger traffic, running from Tampico to Panuco. It was forced to sell the road for scrap because of lack of traffic.

Oil exploration and development work in foreign countries usually involves the creation of all the necessary facilities for such activity as well as the construction of roads and furnishing other public services not directly related to oil search. This constitutes a business risk far greater than similar activities in the U. S.

Important as are economic and physical risks which, however, the petroleum industry willingly takes on its own responsibility, they are less a factor in investment in foreign countries than political risks. These, being less predictable, offer the greatest uncertainty. They are also compounded, since they make the investor vulnerable not only with respect to shifting political policies of the country whence the capital is derived but also of the country in which it is being invested.

Despite the increasing political risks of recent years — in some countries converted into actual loss through confiscation and expropriation —

Worker's Camp at Caripito, Eastern Venezuela (Standard Oil Co. (N.J.)



American companies have persisted in seeking and holding a foothold in foreign countries wherever possible.

The report traces the trend toward nationalization in many countries, recites the losses suffered through confiscation or expropriation of properties developed through American initiative and enterprise and reviews war risks and losses undergone during the world struggle just ended. It describes at length the economic benefits to foreign countries of American oil operations through the employment and revenue provided, expenditures for social and educational purposes and the construction of roads, hospitals and other public works. It also outlines the advantages to the United States from foreign oil operations of its nationals, the safeguard to national security and the stimulation of trade through increased demand for oil equipment and other industrial products. During the twelve years 1930 through 1941 exports from the United States of crude oil producing, pipe line and refinery equipment averaged $27,500,000 annually and totaled $329,979,000. The history of American participation in foreign oil enterprises is traced and the contribution of those undertakings to the winning of the war are described. The report presents a study from every angle of national and international concern and provides an ample basis for the development of a sound and durable oil policy.

Summarizing the results of its study the group presents the following as its conclusion as to the importance of American participation in world oil operations:

"Participation in the development of oil production and reserves and in petroleum refining, transportation and marketing in foreign countries by American oil companies has had a sixfold importance.

(1) It has enabled us to maintain abroad an American business of large proportions with resulting benefits to the nation.

(2) It has made it possible for this country to supplement United States reserves in carrying on a world petroleum trade in which American capital pioneered and still has a tremendous investment.

(3) Only by such activities could American interests meet foreign competition which derives oil supplies from both foreign and United States sources.

(4) With respect to Western Hemisphere development, it is insurance of contiguous, readily marketable supplies against the day when United States' needs will require greater supplement from abroad.

(5) Participation in foreign oil development is a means towards world peace in guaranteeing American-controlled supplies for national defense in strategically located parts of the globe and is so recognized by our State, War and Navy Departments.

(6) The United States, accounting for about two thirds of the entire world's petroleum consumption, is compelled to control an adequate share of foreign oil production and reserves to insure high living standards in its domestic economy.

"At the same time participation by American oil companies in foreign business has also afforded broad social and economic benefits to the foreign countries themselves. Among such results are the following:

(1) That the development of natural resources with the aid of foreign capital greatly benefits the people of the country in which the investments are made.

(2) That these activities create new productive wealth.

(3) That this, in turn, stimulates trade, not only with the investing nation but also with the rest of the world.

"The American oil industry has had the foresight, the enterprise and the courage to go into foreign oil development and markets. Its foreign position is not unfavorable but if new domestic oil discoveries do not keep pace relatively with increasing United States demand (as has been the tendency in recent years), foreign reserves under American control must be expanded in order to maintain reserves in safe balance with our requirements.

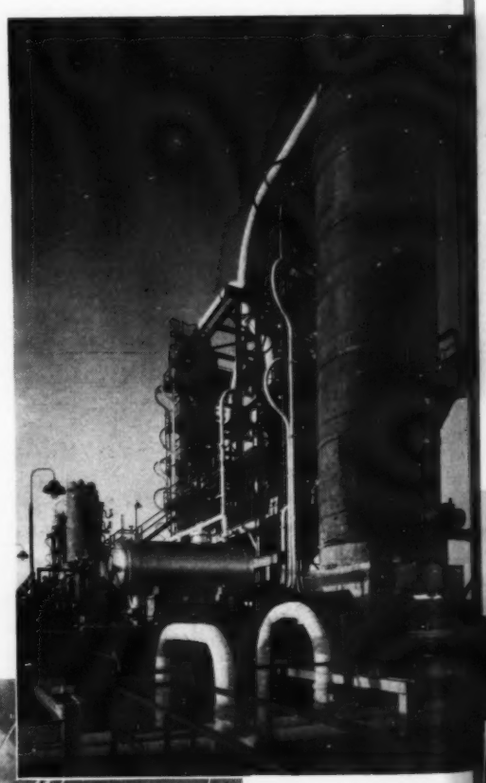
"There are four great oil-producing regions in the world in addition to the United States, namely, the Caribbean region, the Caspian basin region of southern Russia, the Persian Gulf region of the Middle East and the Netherlands East Indies.

"American companies lead in the first with British-Netherlands interests in second place. In the second, Russia has exclusive state control. In the third, British interests dominate although American companies hold extensive properties with large proved reserves. In the fourth, British-Netherlands interests lead, with American companies becoming increasingly important.

"All these areas are expected to be actively and increasingly exploited as from the war's close. Producing fields long occupied by the enemy or destroyed are reoccupied and rehabilitated as foreign civilian markets for petroleum products return. In this revived activity there will be the keenest international competition.

"The future of foreign investments by American oil companies depends to a large degree on their ability to compete freely in the sale of crude oil and products in the markets of the world, as well as in their obtaining a share in foreign oil production and reserves. The principal obstacles to this free competition are financial and political in character. Exchange restrictions are of so great concern that the petroleum industry asks that the fundamental conditions which have given rise to exchange control be corrected.

"It has been shown that political risks are even more onerous than economic and physical risks in foreign activities. A national oil policy en-



Above: Pipe Stills of Refinery at Port Jerome, France (Standard Oil Co. (N.J.).

Left: Transferring Iraq Oil to Tanker at Haifa, Eastern Mediterranean.

couraging to American enterprise abroad would aid materially in decreasing political risks.

"It is recognized that nationalization or the threat thereof, the throwing up of trade barriers, governmental cartels and the like (expected to be carried over into the post-war era in even more pronounced form) do not lend themselves to easy diplomatic solution. Nevertheless, if American companies are not allowed the same freedom of action as their foreign competitors to operate in accordance with the laws and customs of foreign countries, regardless of their merits, loss of our foreign oil development and markets cannot but result. It is essential, therefore that the industry be freed insofar as possible from the uncertainty as to the conflict between American laws and the laws and customs of foreign countries.

"Moreover, if the American oil industry is expected to participate in foreign oil development as a measure of national security, the problem ceases to be one solely involving the industry but in addition becomes one vital to our government and to the American people.

"The war has brought home to us the importance of having far-flung bases of supply abroad. To insure that these facilities be available to our military forces in time of emergency we must have peacetime markets. The contribution of American development of oil reserves accessible to the United States to the insurance of United States peacetime consumption demands has been noted and its bearing on added national defense insurance also should be stressed.

"It would seem advisable that our government be especially vigilant in encouraging and assisting American interests in the principal regions referred to. The Caribbean area oil proved valuable in the winning of the war. Oil in the Middle East aided victory and won that area recognition by our government for its strategic importance.

Pre-War View in Fields of Romano-Americana, Romania (Standard Oil Co. (N. J.).

"As a result of the firm attitude taken by the United States government in the early 1920s for the right of its nationals to participate in the petroleum resources of the Netherlands East Indies, the Netherlands accorded to American interests available producing rights which they otherwise undoubtedly would not have obtained, and just prior to the Japanese invasion of the Netherlands East Indies, American interests were producing at the rate of about 41,000 barrels per day. Had it been possible to prevent occupation by the Japanese, that source of oil which included aviation gasoline and other military and navy fuels would have been strategically placed for use by the United States military forces in the war against Japan.

"With victory over Japan and considering future U. S. bases in the Pacific, our participation in oil development in the Persian Gulf, Netherlands East Indies and all other present and potential oil regions of Asia and Oceania becomes increasingly a matter of national concern.

"As it now stands, American interests are excluded, except on a minority basis, in such countries as British India, Baluchistan, Burma, China and the Philippines, Brazil, Chile, Trinidad, Mexico, Bolivia and Uruguay. It is submitted that the precedent set in the Netherlands East Indies, where a firm American attitude against discrimination toward American oil interests was successful in obtaining the elimination of such discrimination, establishes the fact that such might be obtained by a similar attitude towards other discriminatory measures in other countries.

"Particularly would this positive position seem tenable inasmuch as the United States does not discriminate against foreign interests in the development of its own resources. Furthermore, it is believed that, without diplomatic assistance of the United States Government, American interests will continue to be prevented from participation in petroleum exploration and development in various countries, except on a minority basis.

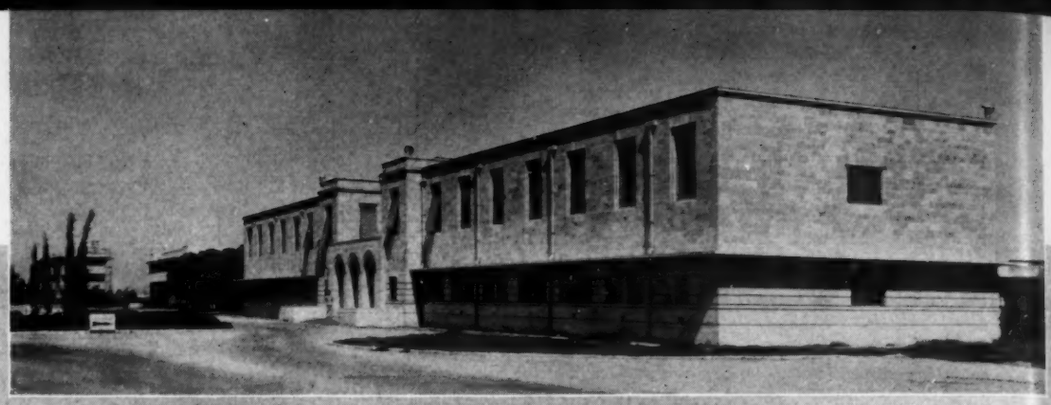
"After World War I the government gave the American petroleum industry a mandate to find and develop oil abroad. How well this mandate was carried out is amply demonstrated, as shown in this report, by the record of discovery and development by American companies during the years 1919-1925 to which activity today we owe much of our present favorable position in foreign oil. But there have been severe set-backs in the last ten years. American as well as other foreign capital has been the victim of discriminatory laws and arbitrary and unjust treatment in many countries. It has been deprived by expropriation or confiscation of title to property legally acquired. Failure on the part of the diplomatic agents of the countries making foreign investments to bring about justice and insure respect for lawfully acquired rights of their nationals exposes capital to injurious treatment by political groups wherever there is desire to undermine foreign investment.

"American oil companies with investment abroad find themselves today in the position of fighting for their legal and economic existence in many countries, and, as has been stated, the experiences they have had in which extensive and legitimate rights have been eliminated or seriously reduced by the action of foreign governments, makes it evident that the problem now is not only how to acquire initial rights abroad, but also how to keep secure those which we now hold or which we may subsequently acquire in foreign production, reserves, transportation, refining and marketing.

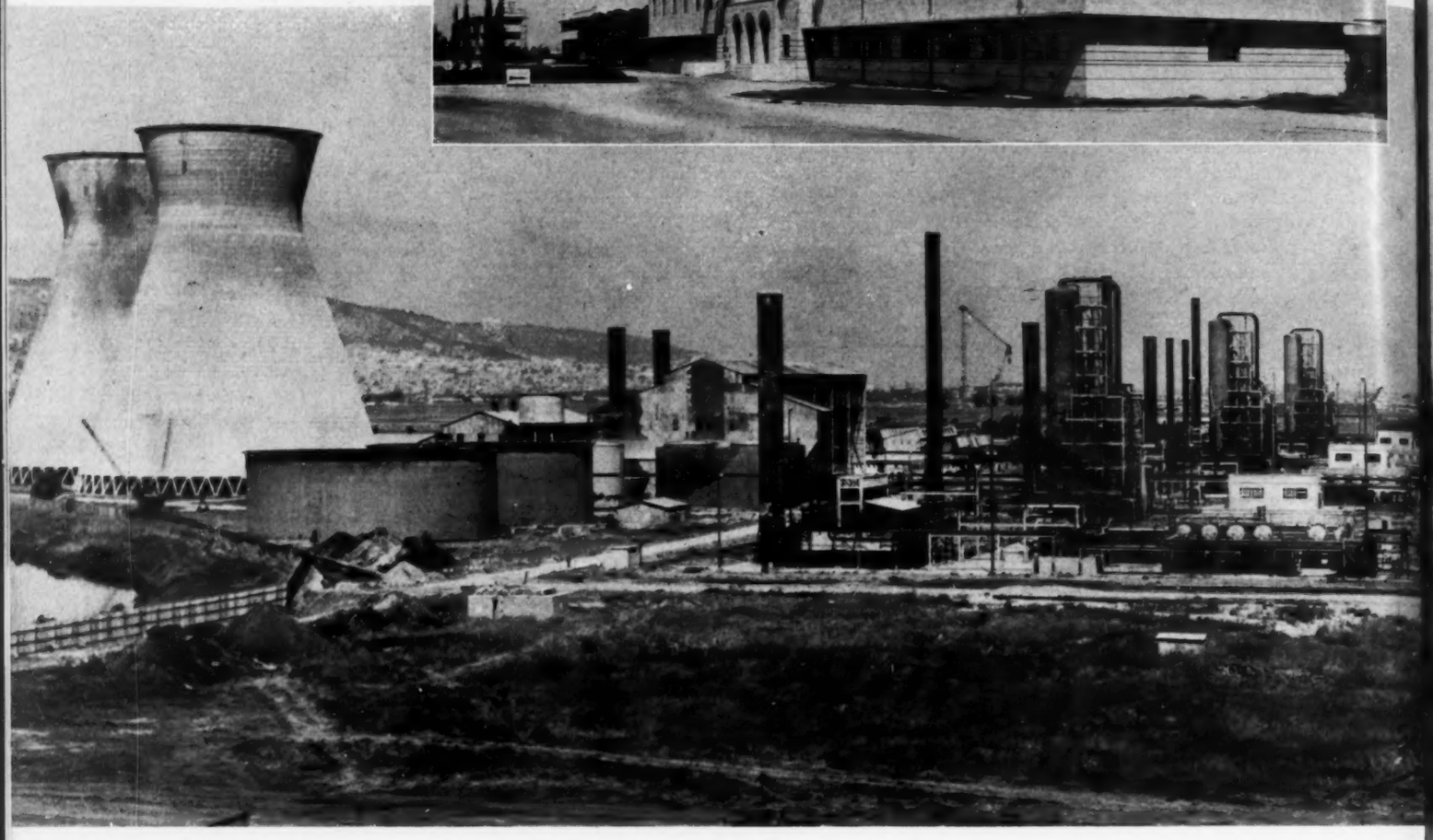
"This situation is further complicated in the post-war period because of large American oil investments in countries located in the European and Far Eastern theatres of war. Some of these properties were damaged or destroyed; some located in territories which either have or might experience a change of sovereignty or which are in the hands of certain of the United Nations and which therefore present special problems for our State Department. The difficulties in working out a solution in such cases are recognized by the oil industry which, however, feels that a solution must be found that will be in keeping with international law and justice.

"The traditional policy of the United States has been to recognize the value of foreign investments and foreign trade in the development of American economic life. This is the policy existing today but it needs reiteration. The government of the United States should proclaim to the world its backing of its nationals in their search for and development of foreign oil resources and make clear that it will expect its nationals to receive treatment not less favorable than that accorded to nationals of foreign countries and to competing government-controlled companies.

"The American oil industry recognizes that again a mandate has been given it to make secure an adequate share in world oil development for American needs and, with this support, it will succeed to this end. Given the same freedom of action as their foreign competitors to operate in accordance with laws and customs of foreign countries, the American oil industry has no fear of fulfilling the mandate. The presence in the world picture of a number of aggressive companies representing commerce-minded nations provides assurance in itself not only that adequate supplies will be available to all nations but that whose supplies will be provided at reasonable prices established on the basis of competition. The very independence of these companies, competing as they are for both supplies and markets, gives the best possible assurance that the world will continue to receive all it requires of the 'essential fuel of peacetime' at economical prices."



Main Administration and Office Building.



HAIFA REFINERY PLAYED IMPORTANT PART IN SUPPORTING ALLIED OPERATIONS IN MEDITERRANEAN THEATRE

By Ernst Aschner

WITH a capacity for handling four million tons of crude oil a year, the Haifa refinery of Consolidated Refineries Limited, has become the biggest refinery in the Middle East after Abadan. It is also the biggest private employer in Palestine. The refinery began production shortly after the outbreak of the war in 1939 and details of plant and production were but recently removed from the secret list.

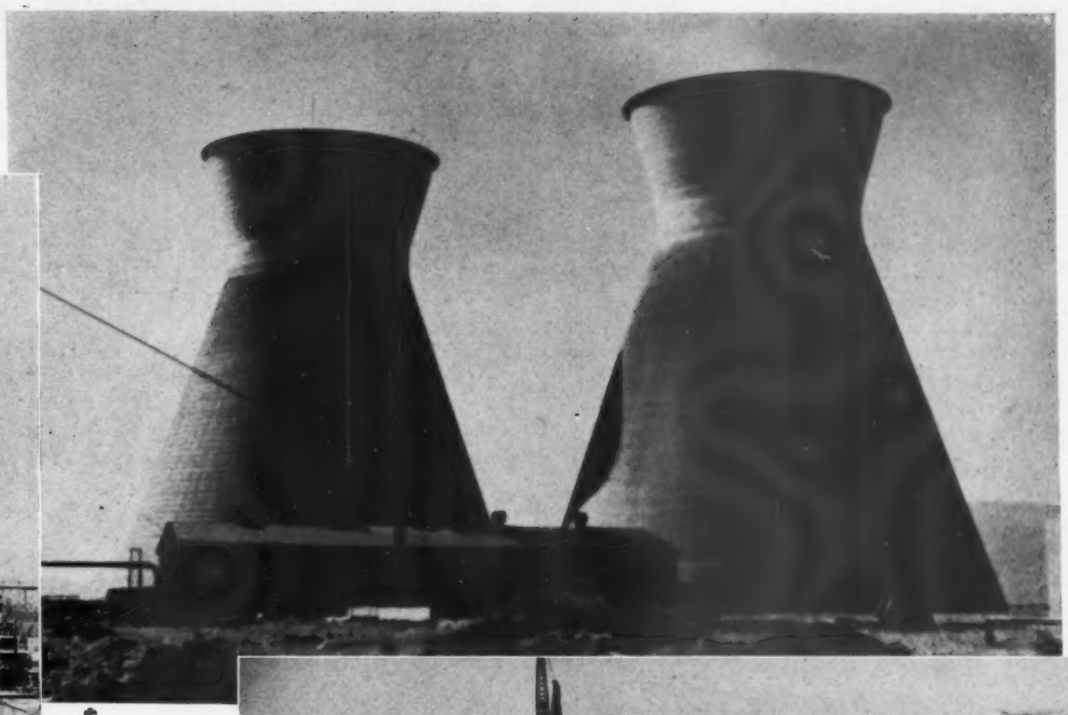
The operating company is jointly owned by the Anglo-Iranian Oil Company and the Anglo-Saxon Petroleum Company (Shell), each of which have an interest in the Iraq Petroleum Company of 23¾ percent. It has made processing agreements with the Socony Vacuum Oil Company and Mediterranean Standard Oil Company under which the share of IPC production accruing to the New East Development Company, holding company for American interests in Iraq is refined at Haifa. The refinery site consists of a roughly rectangular area of 360 acres along the tiny river Kishon on Haifa Bay. It is situated some 3½ miles from Haifa port and the center of Haifa town.

Originally designed for an initial capacity of 2,000,000 tons per year, allowance had been made for certain extensions, which were eventually carried out during the wars years, when the importance of the refinery for the war effort attained top rank.

Construction work on the site actually started in October 1938 and the original plans were followed until the outbreak of war in September 1939. At that time the construction program was modified to allow for the completion of one crude distillation unit and the other necessary equipment at the earliest possible moment. Throughout the first year of construction, seven or eight shiploads of machinery were brought in monthly, including steel plates, pipes, fabricated vessels, towers and other equipment from the United States and England. Trains loaded straight off the ships brought the materials direct to the refinery site. In addition hundreds of thousands of tons of local building materials, such as cement, sand, stone and concrete pipes poured in by road from nearby factories. Construction was in the hands of The M. W. Kellogg Company which employed some 4,000 local Arab and Jewish laborers during the first year of construction in addition to some 200 American foreman, welders and other experts.

Initial work on the site included an extensive sub-drainage scheme, necessitated by the swampy

Below: General View of Cooling Towers, Crude Topping and Cracking Units and Power Plant. Reforming Units at Right.



Above: Cooling Towers.

Construction Work on Crude Topping and Cracking Units.

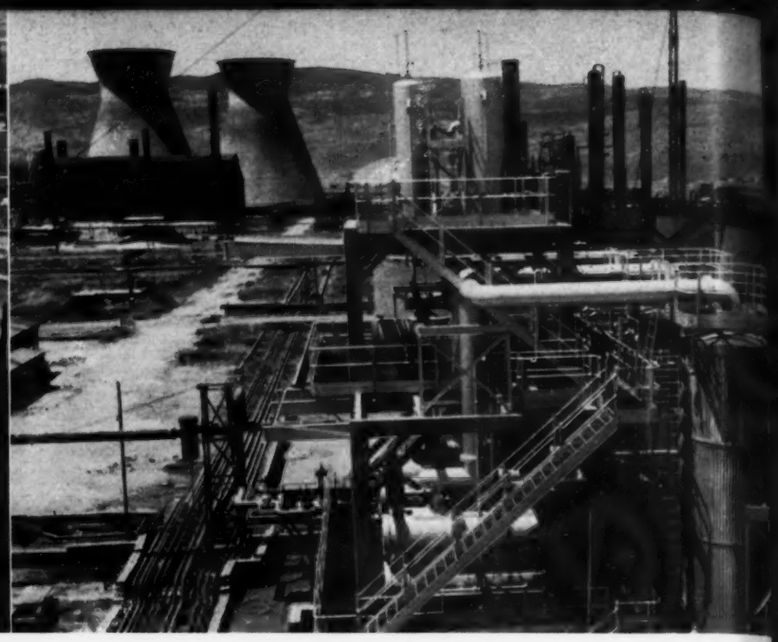
condition of the ground; excavations for tank and building foundations and laying of over ten miles of roads. These roads divide the site in different areas, including the tank farm area, treater area, distillation area, services area, each of which covers a wide tract of land.

By the end of November 1939, one crude topping unit, two treating units, certain tankage and a temporary battery of rig boilers were ready for commissioning and actual refinery production began on November 29, 1939, one year ahead of schedule. During 1940 essential construction work was continued at top speed and toward the end of the year an acid plant, two more washeries, one re-run unit, one acid tar burnery and one boiler in the boiler house were put into operation. In the early part of the following year (1941) the topping side of the second crude unit was commissioned and in June 1941 the power house was completed, producing electric power for refinery requirements, which up until then was supplied by the Palestine Electric Corporation. The second re-run unit came into operation in December of the same year, while the gasoline stabilizer unit was completed two months later, when work was also started on the butane filling plant.

In order to cope with the ever increasing demands for refinery products, it was decided to revamp the cracking section of both the crude units which were not in service and to convert them into additional crude distillation units. This work was completed in March 1943, while asphalt production began a year previously following the reconstruction of the vacuum side of the two crude units. At the request of the military authorities a drum plant for the production of asphalt drums and later for gasoline containers was also constructed. This plant is operated on behalf of the Military and is housed in a building originally constructed to receive equipment for SO_2 extraction of kerosene. Due to the outbreak of war this equipment never arrived at Haifa.

In order to supply the maximum quantity of refined products required for the war effort, work was started at the beginning of last year on the construction of a third crude unit (topping section only) another re-run unit, a second stabilizer unit and an additional treater installation. Setting up the additional plant in record time, the third re-run unit was ready in July 1944, the crude unit one month later, the stabilizer in November and Treater No. 8 in December 1944, thus bringing the refinery capacity up to four million tons per annum.

Construction in Progress—Crude Topping and Cracking Units in Foreground—Reformer Units in Background.



Rerun Units in Foreground—Crude Topping, Cracking Units and Cooling Towers in Background.

Throughout the past year the refinery has been working at maximum capacity and it is expected that the throughput for 1945 will be four million tons of crude oil, or roughly five times the quantity handled during 1940.

Among the refinery's auxiliary plants, the power station and water cooling installation should be mentioned. Steam raising is done by four Spearing high pressure boilers, each of which produces 150,000 pounds per hour of 500 pounds per square inch steam, supplying the power for three turbo-generators installed by the English Electric Company which have a capacity of 6,250 kilowatts each. The main features of the water cooling plant are two giant cooling towers, each 250 feet high and having a diameter of 250 feet at the base. These towers, which are of the parabolic type, are the highest buildings in the country and a landmark of Haifa. They were constructed under patent rights of Film Cooling Towers Ltd. and 8,000 tons of concrete were needed in the process. Each tower is designed to cool two million gallons of water per hour. The water which is used in the refinery process is collected in a sump and pumped up over the cooling towers by pumps of 30,000 gallons per minute capacity each. The cooled water flows to another sump, from which it is redistributed by a further set of pumps. The water losses are made up by water drawn from wells some ten kilometers north of the plant where a special pumping station was constructed.

Other auxiliary plants include the sulphuric acid plant, which has a capacity of 30 tons of 98% H_2SO_4 daily. The acid is required for treating purposes in the refinery, and at the request of the Controller of Heavy Industries, Palestine, surplus acid has been supplied to the Palestine Chemical Industries. There is also an oxygen plant producing 100 cubic feet of oxygen per hour; and a butane bottling plant which supplies the domestic requirements of Palestine at the rate of 20,000 cylinders of 12½ kg each monthly.

The total number of persons directly employed on the refinery includes some 1,850. The entire British staff comprises only about 50 technical and administration experts while there are some 250 Arab and 175 Jewish monthly paid workers and about 1,100 Arab and 290 Jewish daily paid workers.

Throughout the war years the output of the Haifa refinery was constantly on the increase, as strikingly illustrated by the following tables:

Crude Oil Input (In British tons)

Year	Quantity
1939	73,000
1940	847,000
1941	1,165,000
1942	2,006,000
1943	2,724,000
1944	3,292,000

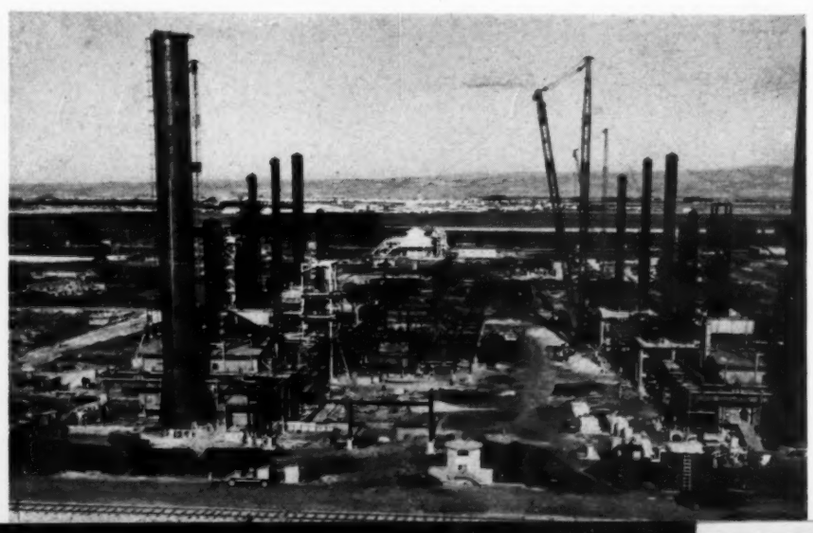
Total Deliveries Up To the End of 1944
(In British tons)

Feb. 1942-1944	Butane	5,000
Feb. 1942-1944	Narrow Cut Naphthas	1,000
Dec. 1939-1944	Gasoline	2,133,000
Dec. 1939-1944	Kerosene	772,000
Dec. 1939-1944	Gas Oil	985,000
1944	Diesel Oil	19,000
Dec. 1939-1944	Fuel Oil	5,894,000
1942-1944	Asphalt	170,000
1944	" (cut back)	16,000

Total Crude Oil Input
Dec. 1939-1944 — 10,097,000

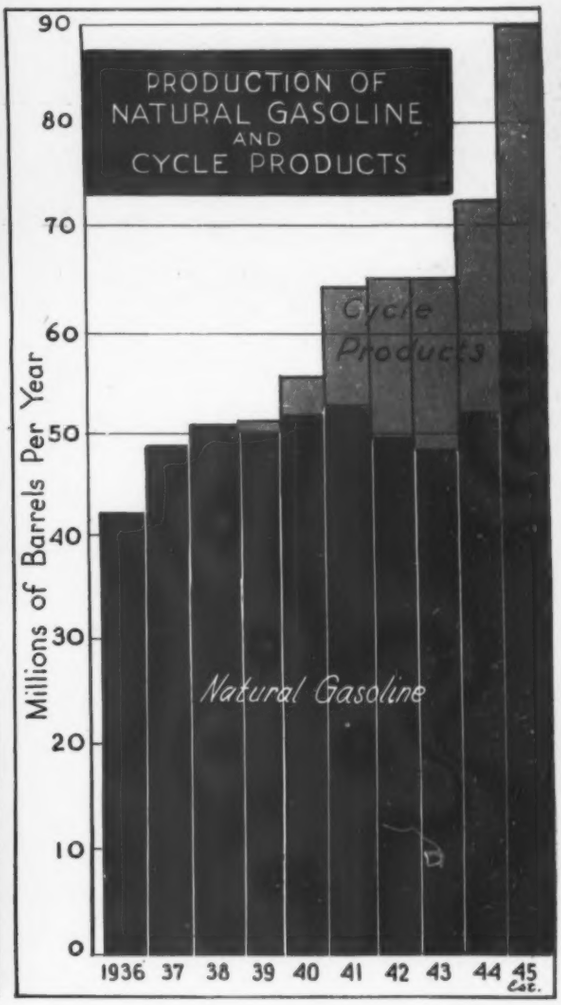
Taking the crude oil input for the first half of 1945 at roughly two million tons, the total refinery throughput during the war was about 12 million tons, over half of which was fuel oil supplied to the Navy, while some two and a half million tons of benzine went to the Army and Air Force. Thus, the importance of the Haifa refinery to the war effort can hardly be exaggerated and it may well be said that without its supplies the war in Africa and the Mediterranean might have taken a different course.

Apart from these vital deliveries the refinery supplied Palestine with its products which kept many important industries alive and permitted expansion of the country's industrial war effort. All the fuel oil consumed by the Palestine Railways, the Palestine Electric Corporation, the Nesher Cement Works and all the motor spirit for the country's road transport were supplied by the refinery, in addition to asphalt delivered for road and aerodrome construction, and sulphuric acid and acid tar supplied for Palestine's chemical industries.



Construction Work on Reformer Units.

Gasoline Plant Absorbers. (Photo Courtesy J. F Pritchard & Company).



ORDERLY MARKETING OF NATURAL GASOLINE AND CYCLE PRODUCTS AN INDUSTRY PROBLEM

By J. C. Chatfield

THE sale of cycle products at good prices has required an active search for willing buyers in a few instances during recent weeks. Some of this difficulty doubtless is the result of dislocations created by the oil workers' strike but it is clear to many in the natural gasoline and cycling industries that orderly marketing of these products may become an acute problem early next spring.

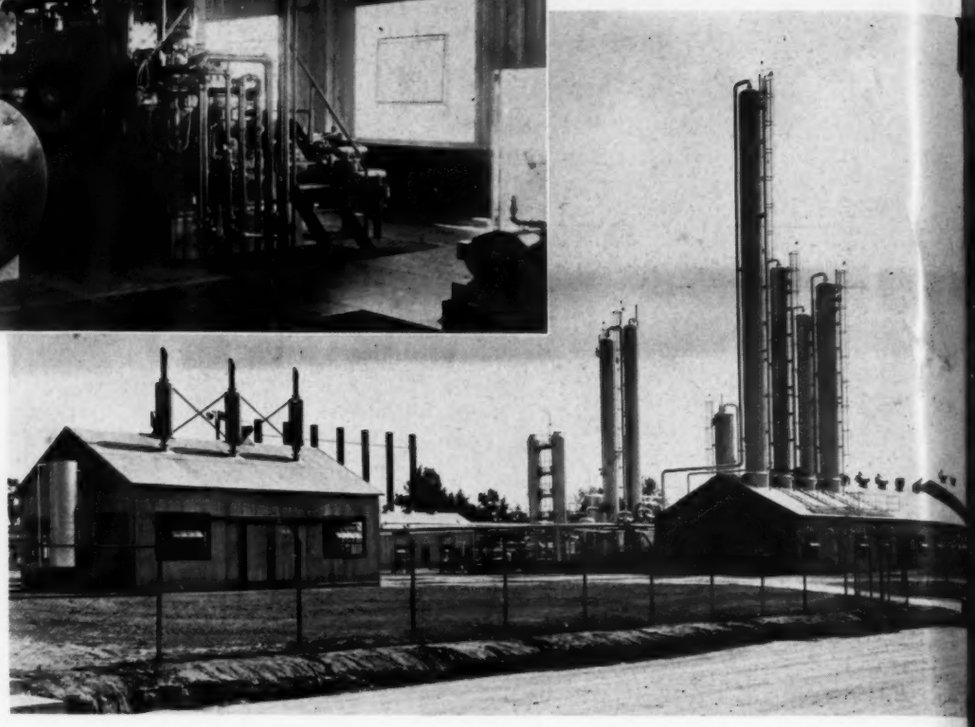
The price received by natural gasoline manufacturers before the war tended to fluctuate widely, both seasonally and from year to year. The fluctuations bore little relationship to the changes in market prices for crude oil or motor gasoline. Crude prices changed only 15 cents per barrel in the immediate pre-war years 1941 and 1943 and motor gasoline was relatively steady, but 26-70 natural gasoline in Oklahoma sold as low as $1 per barrel and as high as $2.20 per barrel in 1941. The next year saw natural drop to 84 cents per barrel and rise again to $2.05.

The violent natural gasoline price movements were not the result of significant changes in supply. Production of natural gasoline and cycle products was rising steadily before the war but in approximate ratio with crude. Output of these light hydrocarbons was equal to 4.6 percent of crude in 1941 and 4.7 percent of crude in 1942. This year the ratio will be down to 4.3 percent but there is every indication that production of liquid fractions from natural gas soon will increase both actually and percentage-wise in relationship to crude. U. S. demand for crude in 1945 will approximate 4.6 million barrels daily compared with 4.5 million barrels last year but with military demand dropping much faster than civilian demand can rise, it has been estimated that crude requirements in 1946, including imports, will be between 4 and 4.3 million barrels per day.

This 6.5 to 13 percent fall in crude demand is not expected to be matched by any similar decline in production of natural gasoline or cycle products. On the contrary, it seems likely that output of these products will rise above recent levels.

The recent survey made by J. O. Sue and Joe Miller of Humble Oil & Refining Company, for the American Petroleum Institute, revealed that there are 224 known condensate fields in the United States with a combined area of 587,000 acres. There are only 39 gas cycling plants operating in the United States, however, and 144 of the condensate fields were either shut in as late as 1943 or produced less than 10,000 barrels in that year. Miller and Sue place total liquid production of all condensate fields in 1943 at 27.7 milion barrels. This figure presumably includes LPG as well as hydrocarbons in the motor fuel range and heavier.

Cycling Plant Compressor Room.



Warren Petroleum Corp. Gasoline Plant, Crossville, Ill.

Eliminating LPG from cycle plant production, the Bureau of Mines reports production at 20 million barrels in 1944, an increase of 28 percent over 1943. The Bureau's reports during the first half of 1945 indicate that production this year may be up 50 percent to 30 million barrels. But this large increase in output does not begin to realize on the potential available in the known but undeveloped condensate fields.

Within the past few weeks Shell Oil Company has been bringing on stream a cycling plant in the 5,000-acre Sheridan field in Colorado County, Texas, which will make an important addition to the nation's supply of cycle products in 1946. Ultimately this plant will process 100 million cubic feet of gas daily.

Another installation scheduled for early completion is the $4 million cycling plant of Glenn H. McCarthy and Frank Champion in Chambers County, Texas, which will process gas from the Stowell, Winnie and North Winnie fields. This plant will produce automotive and aviation gasolines as well as natural gasoline and LPG from 85 million cubic feet of gas.

A little later the 175,000-acre Carthage, Texas, field will contribute its share to the growing list of large cycling and gasoline plants. Chicago Corporation, United Gas Pipe Line Company, Arkansas Fuel Oil Company and Lone Star Producing Company all are building or engineering plants in the Carthage area. Combined capacity of the group will be in excess of 325 million cubic feet daily.

There are a number of known condensate fields in the Gulf Coast which remain undeveloped only because of war-time scarcity of materials. The next year should see many of these plants leave the drawing boards.

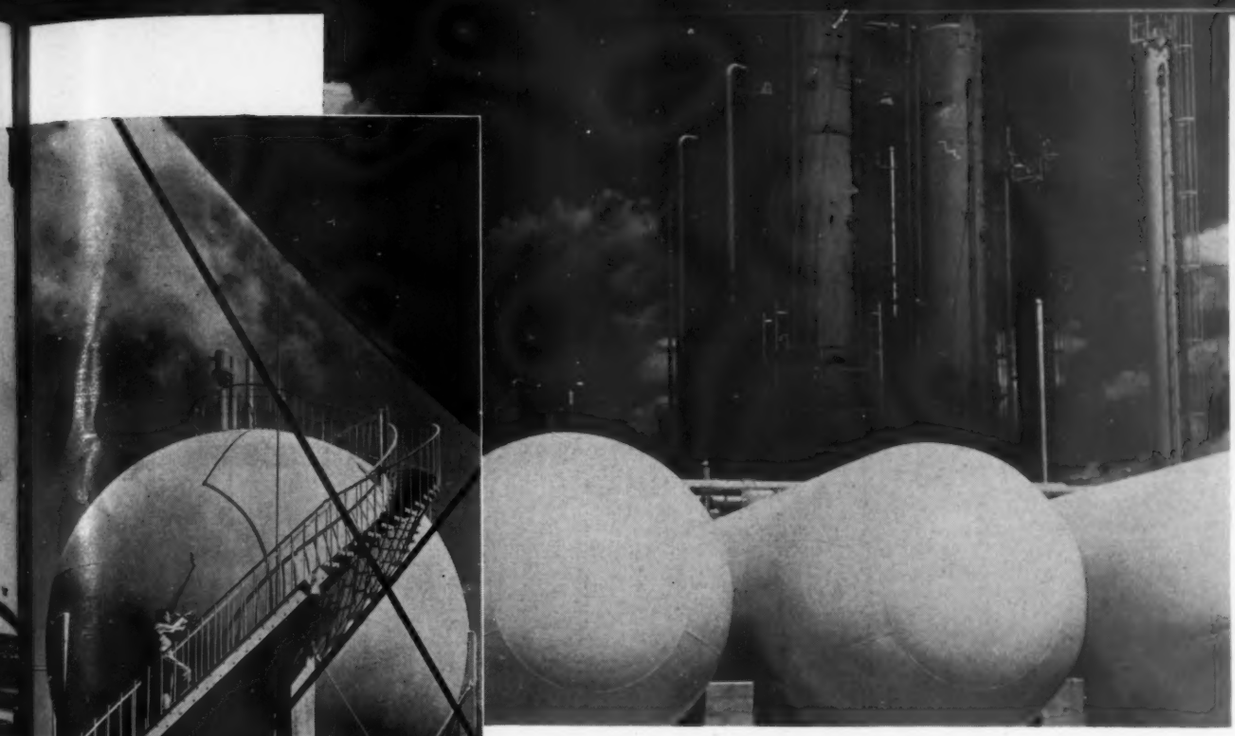
In addition to cycling plant construction projects mentioned above the natural gasoline industry will build a considerable number of new plants. Atlantic Refining Company is building a plant at Neal, La., which will be on stream about April 1946. Atlantic probably will erect another plant in Louisiana soon. Barnsdall Oil Company is considering a large plant for the new area it is proving up north of Shreveport, La. Humble has announced four plants for the Gulf Coast to process 56 million cubic feet of gas daily. Stanolind Oil & Gas Company is building a 30-million-cubic-foot plant in the Hastings field near Houston. Numerous gasoline plant enlargement programs are under way in the Panhandle and in West Texas by Phillips Petroleum Company, Shell Oil Company, Skelly Oil Company, Cities Service Oil Company and Texhoma Natural Gasoline Company. In Kansas Northern Natural Gas Company is building a plant near Sublette to process pipeline gas.

On a rough calculation, the plants which are to to come on stream before the end of 1946 will process about one billion cubic feet of gas daily if operated to capacity. Assuming a yield of 0.9 gallon per thousand cubic feet of gas processed the new plants will add about 21,500 barrels per day of natural gasoline and cycle products to the nation's supply. This would be an increase of about 20 percent.

One reason for the possible reluctance of the refining industry to absorb any large increase in production may be found in the effect of catalytic cracking on the supply of light hydrocarbons available at refineries themselves. Even before the war there were some refiners who bought little or no natural gasoline in the open market. Some were reluctant even to use the volume produced by their own gasoline departments. During the war the increase in catalytic cracking plants obviously has made it possible for many more refiners to eliminate natural gasoline blending if they wish to do so.

Refusal of the refining industry to absorb all of the natural gasoline and cycle products available may contain a greater element of danger to orderly marketing in the post-war period than it did before the war. Even then low markets for natural gasoline always threw increasing quantities into the jobber and retail station market direct. Much went to the cut price trackside station market. After the disastrously low markets of 1940, for example, the natural gasoline and cycling industries nearly tripled their sales products direct to jobbers and retailers; from 6.7 million barrels in 1940 to 20 million barrels in 1941. The wartime demand for light products, in fact anything that would burn in a motor car, quickly reversed this trend so that 1944 sales direct to the trade were back down to about six million barrels.

The same sort of improvements in manufacturing techniques which have made the refiner more independent of the gasoline and cycling industries have likewise made the gasoline and cycling industries a potential competitor of refiners in the production of first grade motor fuel. Some cycling plants with butane and pentane splitters were producers of finished 80 octane all purpose fuel during the war. TEL blending is done there as well as at oil refineries. Natural gasoline plants have not been large producers of finished motor fuels but there is no reason why such fuels cannot be produced with the importation of limited amounts of naphtha for regulation of the 50 percent point. Also the development of pentane isomerizers and small size, low-cost catalytic reformers now make it possible for the gasoline manufacturer to produce very high quality motor fuel. It has been said that community processing plants are feasible in



Extreme Left: Refinery Storage for Light Fractions. (Robert Yarnall Richie Photo).

Left: Butane Storage Tanks at Phillips Petroleum Company Plant, Borger, Texas.

fields where there is a large concentration of raw materials and that these plants can produce finished motor fuels at costs which crude oil refiners would find it difficult to match.

In general, the gasoline and cycling industries are not anxious to enter the motor fuel business unless they are forced by low prices to do so. They much prefer to pump their unfinished products into crude oil pipelines or into tank cars for blending or further processing by oil refiners who now have their own established marketing outlets. They do not have sales organizations and do not want to expand in that direction.

Post-war pricing of natural gasoline and cycle products doubtless will come in for much study and possibly some change. The growing use of butane as LPG and for chemical synthesis will be one factor. Demand for butane as LPG was growing very rapidly before the war. In the past two winters there has been an acute shortage during the heating season. Last winter the PAW issued an order requiring natural gasoline manufacturers to limit the vapor pressure of their natural to 16 pounds and authorized diversion of isobutane-normal butane blends from aviation plants to LPG.

The volume of butane required for synthetic rubber manufacture is an unknown factor but is expected to be substantial. Chemical plant requirements also will grow but these outlets should be considered as minor in volume when compared with either LPG or motor fuel.

During the war refiners on the Gulf Coast paid as much as 4.4 cents per gallon for butanes in the East Texas field. Since the cessation of hostilities the price paid, under some contracts, has fallen below the 2-cent price usually offered by buyers of butanes for resale as LPG. This change in price may be looked on as a result of the closing of one of the large butadiene plants and the sudden drop in aviation gasoline consumption.

Because of the varied uses to which butane now is being put there are a good many in the industry who think that butane-free natural should be the standard grade of natural gasoline instead of the present 26-pound grade containing 35-40 percent butanes. It is suggested that the price of butane-free natural be related to crude oil, and that the price of more volatile grades should be the price of the butane-free product plus the going price of the butane added. Whatever the scheme adopted it seems obvious that it will be to the advantage of the oil refiner to work out an equitable pricing arrangement and buy enough natural gasoline and cycle products to prevent the erection of a large number of small motor-fuel processing plants which would be competitors in automobile gasoline market and which would tend to disrupt orderly marketing.

From the standpoint of the national economy it is, of course, desirable to conserve the liquefiable fractions of natural gas currently even though it may tend to reduce momentarily the demand for crude oil. Natural gasoline plants particularly should be kept going although producers of crude oil suggest that if there is to be any proration to market requirements that cycling plants should be prorated too.

While there may be some surplus of natural gasoline and cycle products by early spring next year most manufacturers and marketers do not expect this condition to become chronic.

Automobile manufacturers will get their labor difficulties solved, get tooled up for new production and America's fleet of passenger cars will reach and pass the pre-war total. Demand for automotive motor fuel will take up the momentary slack and oil refiners again will be eager for natural gasoline as they were during the war.

Capacity and Production of Cycling Plants

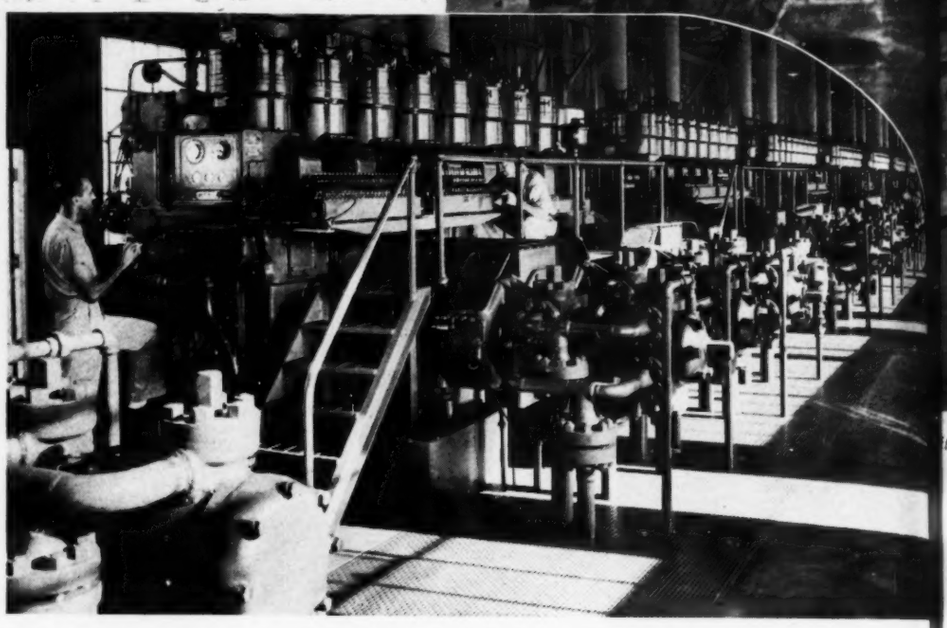
Company	Field	Capacity MCF/Da.	Recovery Bbls./MMCF	Production Bbls./Da.
Agua Dulce	Agua Dulce	60,000	19.1	400
American Liberty Oil Company	Blessing	30,000	32.6	800
American Liberty Oil Company	Grapeland	55,000	9.1	275
Anco Gas	Long Lake	50,000	20.7	1000
Chicago Corp.	Stratton	125,000	14.1	2800
Chicago Corp.	Agua Dulce	125,000	26.2	2150
Cotton Valley Operating Comm.	Cotton Valley	150,000	72.23	9825
Distillate Production Corp.	North Houston	60,000	31.0	1850
Francitas Gas Co.	Francitas	60,000	36.4	1300
Gasoline Production Corp.	Grapeland	60,000	21.4	700
Geier-Jackson Recycling Co.	Grapeland	55,000	25.0	875
Gulf States Recycling Co.	San Salvador	39,000	5.9	260
Gulf States Corp.	Agua Dulce	125,000	24.3	2800
H. M. Harrell	Bammel	50,000	26.2	750
Humble Oil & Refining Co.	Katy	565,000	27.4	13000
Hunt Oil Co.	Long Lake	55,000	26.4	975
O. W. Killam	Joyce Richardson	30,000	12.6	225
La Gloria Corp.	La Gloria	230,000	27.4	6100
Lone Star Trinity	Grapeland	75,000	21.9	1300
Lone Star Prod. Company	Opelika	90,000	58.1	3750
Lone Star Prod. Company	Willow Springs	50,000	14.3	400
Montgomery Superior Oil Co.	Lake Creek	68,500	153.0	4000
L. M. Lockhart Oil Company	Agua Dulce	40,000	19.8	700
Paloma Operating Unit	Paloma	50,000	155.0	8000
P. H. Pewitt	Joaquin	20,000	3.1	45
Roeser & Pendleton	Cayuga	10,000	13.3	60
Shell Oil Co.	Sheridan	100,000	68	*
Skinner & Eddy Corporation	Alice Ben Bolt	100,000	11.9	875
Stanolind Oil & Gas Company	South Jennings	55,000	25.5	1200
Stanolind Oil & Gas Company	La Rosa	60,000	15.5	560
Sun Oil Co.	Seabreeze	16,000	6.8	80
Sun Oil Co.	Willow Slough	13,000	5.7	50
The Texas Co.	Erath	220,000	80.0	16000
The Texas Co.	Lake Mongoulois	9,000	21.2	50
The Texas Co.	Bateman Lake	30,000	26.2	600
Tidewater & Seaboard	Cayuga	60,000	19.1	950
Tidewater & Seaboard	Long Lake	60,000	21.1	1200
Trinity Gas Corp.	Long Lake	20,000	11.9	175
Trinity Gas Corp.	Sejita	60,000	—-	2500

*Not yet in full production.

Erath Cycling Plant Handles Big Volume of Gas Condensate

By Daily Processing of 220 Million Cu. Ft. it Produces 10,000 Bbls. of Liquid Products. Since Discovery in 1940 Field Has Been Developed on Unitization Plan as Cycling Project — Has Thirty-one Producing Wells Including Fourteen Dual Completions.

Photos by Robert Yarnall Richie



The Erath field, located in south central Louisiana in the midst of a rich sugar cane and rice producing area is one of the major gas-condensate reserves of the Gulf Coast, and has contributed substantial quantites of butanes and isopentanes for the war time 100-octane gasoline program. In its organization as a unitized project, and in the use that has been made of advanced methods of production, it is an outstanding example of skilled engineering applied to a condensate field.

THE Erath field lies in the Gulf Coastal Plain, which here has an elevation of six to ten feet above sea level. There is no surface expression of the underlying geological structure, which consists of a distinctly domal uplift affecting an area about five miles in diameter. The dome was probably caused by a deep-seated salt plug. A southward-dipping fault crosses the north side of the field. This is the only fault found in the field, a rather unusual condition for Gulf Coast domes of this magnitude; the displacement varies from 325 feet on the northwest flank to 400 feet on the northeast. Closure at the 10,000-ft. level north of the fault is at least 250 feet; in the south about 350 feet.

The Erath field is situated on the west flank of the Mississippi Valley geosyncline, in which a thick series of sediments were deposited in late mesozoic and cenozoic times. The synclinal trough plunged southward so that these beds thicken from north to south. It is believed that the whole Mesozoic-Cenzoic section is at least 30,000 feet thick. The regional dip is approximately south-southeast.

Since the structure is wholly concealed by late deposits, all conclusions are based on a study of electric logs, wire line cores, and drill cuttings. The Tertiary consists mainly of thick sand bodies separated by shale beds. All the producing sands are of Miocene age; the Oligocene was not reached in the deepest well — 12,033 feet.

The discovery well of the Erath field was the Texas Co. 1 Vermillion Parish School Board, completed in the "A" sand at 11,300 feet in April, 1940. Nine gas-distillate wells were drilled in the field by October, 1941. From the information collected in these operations it was concluded that the producing formations below 8,000 feet carried only gas and condensate, with no commercial accumulations of oil. The operators therefore came to a decision to unitize all producing horizons below the 8,000-ft. level in order to assure orderly and efficient exploitation of the field, to construct a plant for recovering "distillate and other products," and to cycle gas in the condensate reservoirs. An operating committee was constituted to administer the proposed unit and cycling plant; sub-committees were formed for field engineering, plant engineering, geology, and for auditing and legal matters. The operating companies and lease owners were represented on all these committees.

The plan of unitization provided that all equities of mineral and royalty owners and lease holders would be based upon the relative value of the hydrocarbons in place under each individual tract. The plan was approved by a preliminary order, No. 34 of the Louisiana Department of Conservation, which gave permission to drill two additional wells. After further official hearings a complete equity determination was legally approved, subject to redetermination after the drilling of 18 additional wells. Under the approved articles of unitization equities were allocated to the individual tracts as follows:

One: The acre-feet of productive sand in the separate reservoir were calculated from revised net productive sand thickness maps.

Two: The hydrocarbon contents of each reservoir was calculated from factors of porosity and interstitial water as determined from core analysis and electric-log data.

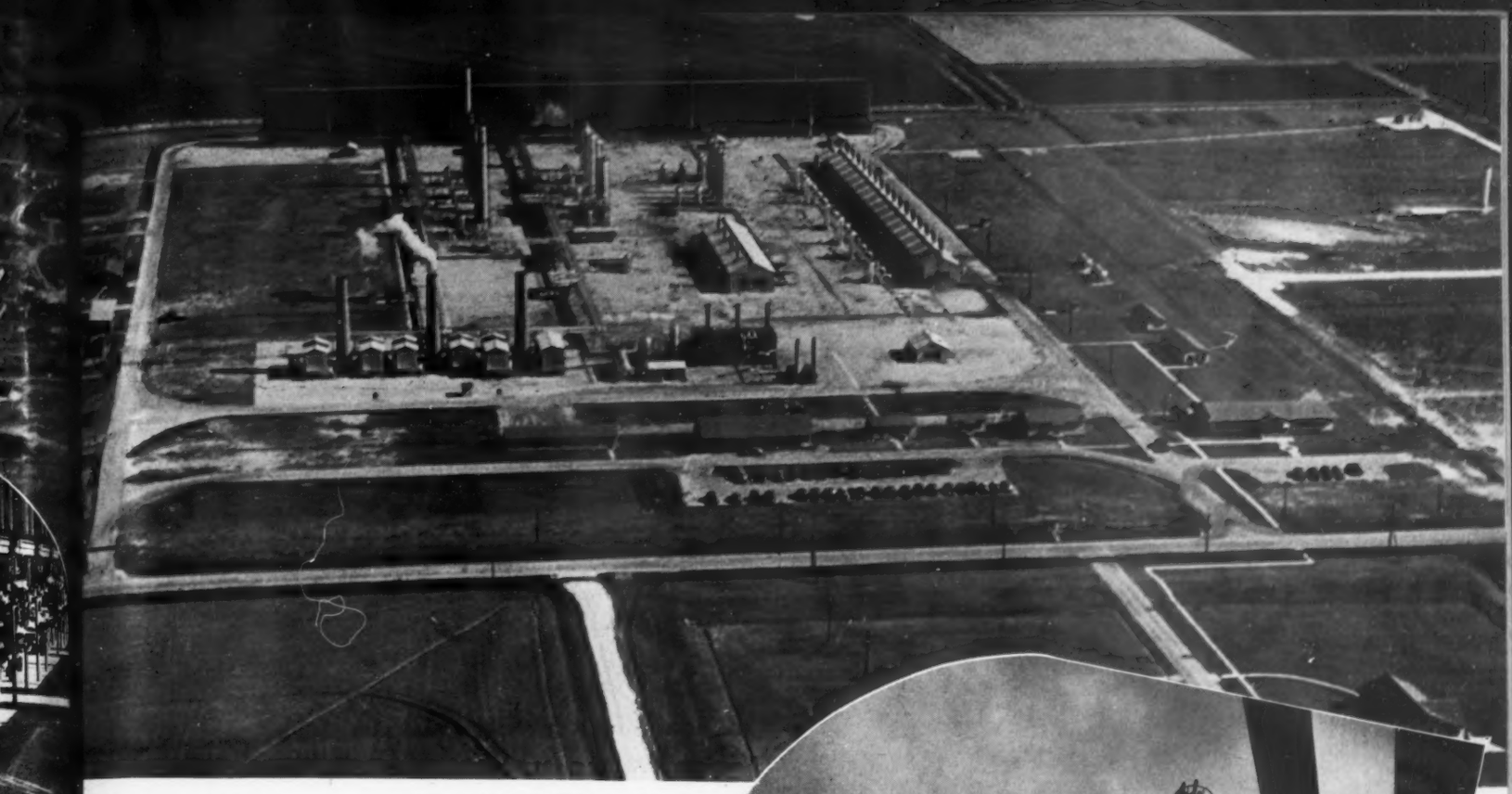
Three: The hydrocarbon content of the sands beneath each tract was computed from extensive well test and reservoir sample data.

Four: The aggregate dollar value for the initial oil content of all reservoirs beneath each tract was figured as a percentage of the aggregate dollar value of the contents of all reservoirs under the entire field below 8,000 feet.

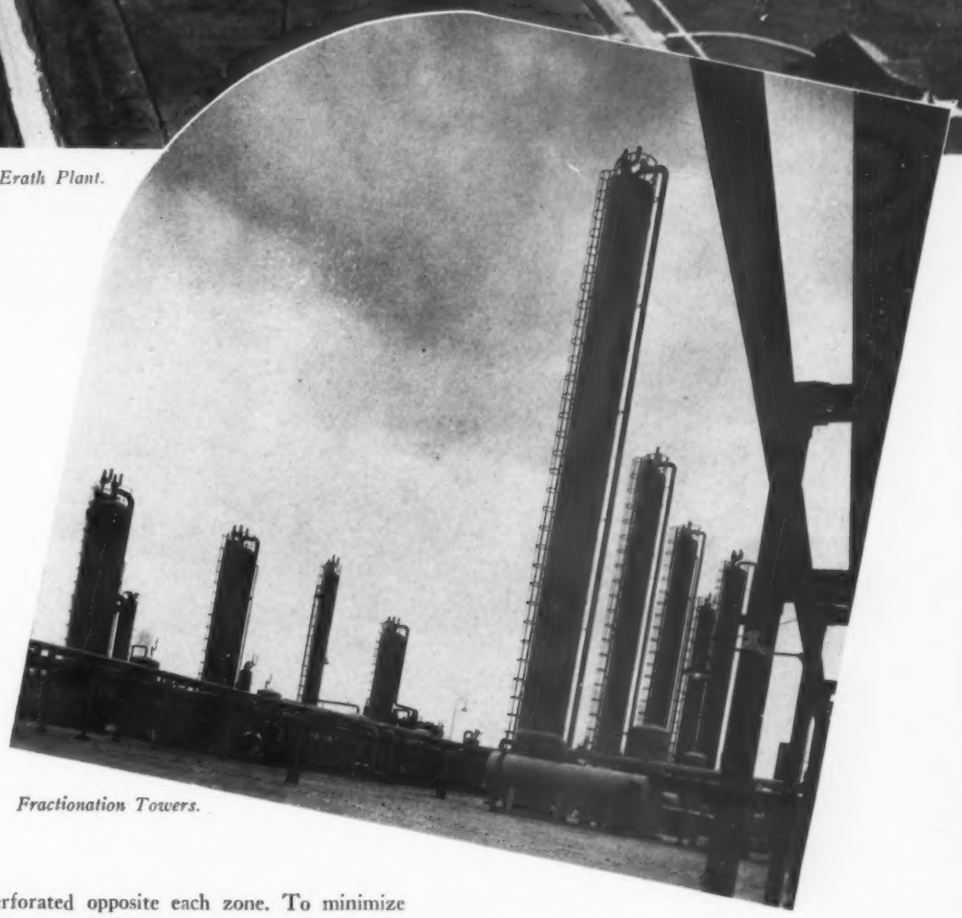
The Texas Company, as the owner of the largest interest in the Erath field, was appointed as operator, and is responsible as such to the operating Committee. The sub-committees which act in an advisory capacity report directly to the operating committee.

For simplicity in accounting, the project is set up as a separate operating district under the supervision of a district superintendent, who coordinates the activities of various branches of operation that are under the supervision, respectively, of a plant foreman, a field foreman, a petroleum engineer, a district clerk and a district warehouseman. A full-time staff of petroleum engineers is occupied in obtaining data to establish production and injection rates necessary for obtaining optimum recovery from all sands, including those not now being cycled. The district clerk handles all accounting for the unit, including royalty payments, payroll, etc.

Prior to unitization 11 wells had been drilled. After unitization 18 additional wells were drilled and 10 of the original 11 were worked over. This resulted in 14 dual completions, 31 producers and 12 injection wells. Production was



t: Compressor Station. *Above: Aerial View of Erath Plant.*



Fractionation Towers.

limited at first to six of the 19 oil sands underlying the unit, with the intent of supplying 200,000,000 cu. ft. of gas per day.

Seven-inch o.d. casing was used in all except one of the 18 new wells. As a rule, casing was run in to the deepest sand in each well that would be produced during the life of the unit, regardless of which sand was initially completed. This was true in each well except those that definitely did not fit into a secondary development program. Only two strings of casing were used on all wells; 10¾-in. surface casing was set at approximately 2,200 ft., and the 7-inch string was set at total depth.

In wells with volumes between 10 and 20 M.M. c.f. per day, 3½-in. o.d. tubing is used; and 2⅞-inch tubing is used in wells delivering less than 10 M.M.c.f.; where the delivery rate is over 20 M.M.c.f. the tubing is 4-in. o.d.

All Christmas trees on the wells are of the stuffing-box polished joint type in which the stuffing box is landed in the top of the tubing head and locked in place by screws in the upper part of the flanged head, thus sealing off the space between tubing and casing. The tubing is sealed off by a specially designed valve run through the 6-in. blowout preventers on top of the polished joint. Gate valves are used on all outlets except for the tubing wing and the crown valve of the tree.

In dual completions two types of packers have been used. One is the retainer type and the other a hook wall packer; both types are equipped with hold-down as well as holdup slips. The casing is perforated opposite each zone. To minimize fouling of the packers by sand, a swab rubber cap is placed in the tubing string below the upper perforations. To minimize erosion of tubing opposite the perforations of the upper zone, tubing centralizers are used above, through and below this zone.

All producing and injection wells are squeeze cemented above and below their perforated intervals, in the one case to prevent migration of saltwater from below, or migration of water from an upper sand to a producing sand. These squeeze jobs are in 2-foot sections that are perforated with 10 shots under a maximum pressure of 5,000 p.s.i.

The field gathering system consists of a high pressure system operating at approximately 2,400 p.s.i. from all wells below the 5,700-foot sand and a low pressure system at about 1,000 p.s.i. for the 8,700-ft. sand. Shortly after the initial operations about 220,000 M. cu. ft. per day of composite gas was being supplied to the plant, yielding about 10,000 bbls. of liquid products. All residue gas, minus fuel and shrinkage

amounting to about 197,000 M. c.f., is injected back into the formations.

At present four sands are being cycled, and two are being produced for make-up gas; the highly prolific 10,400-ft. sand is the nucleus and main producer.

The 8,700-ft. sand is being produced from 14 wells 13 of which are dual completions. There is only one injection well in this sand located on the east side, while the producers are on the west side. The 10,100-foot sand is produced from four wells on the east, about 3,000 feet distant from the one injection well on the west.

The 10,400-ft. sand is cycled by eight injection wells on the periphery of the field and seven producers in a north-south line approximately on the structural high of the field. This sand accounts for over two-thirds of present production. The 10,800 ft. sand is cycled from west to east with two injection and three producing wells. The 11,300 ft. "B" north sand produces from two wells north of the fault. There is no injection of residue gas back into this sand. The 11,600-ft. sand is the one from which make-up gas is taken from its one producing well.

Future cycling programs will also be arranged about one large sand as a nucleus. For example, the same injecting and producing wells now in use for the 10,400-ft. sand will be used for the 11,100-foot sand. The small reservoirs and the sands below the 11,100-ft. sand will produce make-up gas at a relatively low rate in the expectation that water encroachment will maintain pressure and thus prevent condensation of liquids in the reservoirs; if not, they will be cycled when the pressure becomes lowered to the point of convenient handling.

Reservoir pressures vary from 3,935 p.s.i.a. to 6,245 p.s.i.a., and reservoir temperatures from 180° to 219° F. Reservoir temperatures and pressures are normal in all reservoirs, except that the pressure in the 11,900-ft. sand is considerably above normal. The average sand thickness of the 19 commercial sands varies from 4.5 to 67.5 feet, while the maximum sand thickness varies from eight to 178 feet. Cores were taken in the major sands in most of the unit-drilled wells. Porosity and permeability are both high; the average porosity varies from 24 to 29.8 per cent, and the average permeability from 500 to 5,000 md., with some values over 10,000. More than 11,400 cores were taken in every well.

Models of the entire field were constructed from net sand maps furnished by the geological committee, and most of the unit wells were located on the basis of cycling patterns developed from these model studies. New data have modified the original conception of some details of the structure and model studies are being rerun in view of the known factors, using reservoir space maps as a basis for the models instead of net sand maps. The cycling program being fixed, variations indicated by the model studies will be taken care of by adjusting the producing and injection rates of the wells. Experience has shown that gas can be successfully injected into wells through perforations entered below water. It is believed that this procedure will obviate the later drilling of more injection wells higher on structure to sweep out the lower portion of the sand.

After field tests had been made to determine reservoir-composition and well-capacity data the engineering committee arrived at the conclusion that a plant of approximately 200,000 M.c.f. per day capacity was the proper size, and it was decided to install a high-pressure absorption plant operating at a maximum pressure of 2,000 p.s.i. Stone & Webster Engineering Corporation became the contractor for construction of the cycling plant and the field system into which have been incorporated all the latest cyling practices. Actual construction began in November, 1942, and operation in April, 1944.

As stated previously, the field gathering system is divided into two separate systems, a high-pressure system for wells below the 8,700-ft. sand and a low-pressure system for wells above that level. A rather unique feature of the high-pressure system is the use of six of the 10,400-ft. wells producing about 12,000,000 feet a day as a separate floating system for automatically reducing production in case any of the compressors are shut down. This floating system operates at pressures varying from 2,400 to 3,000 p.s.i.; the gas passes through a regulator which maintains 2,400 p.s.i. on the main high-pressure field gathering system and then through reducing regulators which keep compressor suction pressure at 1,850 p.s.i. Thus any change in the capacity of the compressors is immediately reflected in an increase or decrease in the volume of gas from the six floating wells.

All producing wells are furnished with meters that are sheltered to prevent formation of hydrate during the winter. Piston type check valves are installed on all high-pressure meter runs as well as plug valves for positive shut off to eliminate danger of backflow into the relatively low-pressure sands.

Due to the extremely high injection pressure contemplated (4,700 p.s.i.) it was necessary to use pipe of 70,000 p.s.i. tensile strength for the six-inch injection-gas discharge headers within the plant area. Side lines of 4-and-3-inch pipe deliver the gas to the individual wells. A liquid injection system is provided as a war-emergency measure in case it became necessary to store gasoline underground. The injection wells are provided with 5,000-lb. orifice meters and check valves like the producing wells.

The high-pressure gas enters the plant from the east and the west and flows into four atmospheric sections located in the cooling tower for cooling from 130° to 100°, and then through the reducing regulators where the pressure is reduced from 2,400 to 1,840 p.s.i., thereby lowering the temperature to 90° F. Next, it passes into two 18-ft. separators with walls 4 5/16-in. thick of multi-layer construction, where it is scrubbed to eliminate condensate carryover. Thence the gas passes into four 54-in. x 50 ft. high pressure absorbers with 20 bubble trays and working at a maximum pressure of 2,000 p.s.i.

From the absorbers the gas passes through suction scrubbers to remove absorption-oil carryover and into the 12-in. compressor suction header to enter the 51 3¼-in. compressor cylinders on the 16 800-h.p. engines, where it is compressed in one stage to 4,600 p.s.i. and leaves the compressor plant through four 6-in. discharge headers. Two of these headers serve the east and two the west sides of the field. The reason for these two separate systems is to make it possible to carry one side of the field at a lower pressure, if desirable to conserve horsepower.

In addition to compressing the injection gas the compressors handle four plant recompressor services. Five 4½-in. compressor cylinders recompress the flash gas from the 1,000 p.s.i. absorption oil and the distillate flash drums to 1,850 p.s.i. This recompressed gas enters the high-pressure absorbers with the inlet gas.

Four 5½-in. compressor cylinders recompress the flash gas from the 400 p.s.i. absorption-oil and distillate flash drums to 1,000 p.s.i. The gas goes into the 1,000 p.s.i. recompressor suction.

Two 16-in. compressor cylinders recompress the uncondensed vapors from the absorption oil and distillate still reflux accumulators. The gas goes into the fractionator feed tank at 85 p.s.i.

Two 28-in. compressor cylinders recompress the vapors from the refrigeration-flash drum, taking suction at 15-in. of vacuum and discharging at 40 p.s.i.

A rather unusual feature of the compressor plant is that each of the recompressor cylinders is on a separate Clark engine in combination with three of the injection cylinders which provides flexibility in that shutting down any one unit only partially reduces one recompressor service. The arrangement is such that there is no necessity for flaring gas even under widely varying operations. Each recompressor has a suction scrubber to guard against unusual liquid carryover. The cooling system for the sixteen 800 h.p. engine is supplied with water by three 5,300 g.p.m. centrifugal pumps.

The retrograde condensate (distillate) from the inlet separators is flashed into a drum at 1,000 p.s.i., from which it flows to another drum at 400 p.s.i.; the flash gas is returned to the recompressors. The low-pressure production passes a separator and the liquid joins the main distil-

Right: High Pressure Pumps.

Extreme Right: Pipe Stills.

late stream; the mixture is flashed to 65 p.s.i. and the gas passes to the low-pressure absorber, while the raw distillate passes into a hot distillate stream; the mixture is flashed to 65 p.s.i. The vapors from here go to the distillate still while the liquid passes through furnaces where it is heated to 520° F. and thence to a distillate still operating at 60 p.s.i. Here is made a 41.5° A. P. I. bottoms product having a 400° i.b.p.; the overhead is partially condensed; the liquid is sent to the depentonizer feed tank and the vapors to the low recompressor system.

The absorber lean oil is pumped to four high-pressure absorbers at a circulation rate of about 6.6 gal. per M.c.f. of residue gas. The rich oil is flashed to two drums operating at 1,000 and 400 p.s.i. respectively; the gas goes to the recompressors, and the rich oil is flashed again to 65 p.s.i., yielding gas for the low-pressure absorber and more rich oil for the main oil stream. The rich oil leaves heat exchangers at 390° F.; vapors are flashed to the high-pressure still, the residual rich oil is heated in furnaces to 500° F. and returned to the high-pressure still operating at 60 p.s.i. Stripping steam is added and a 390° end-point product is taken overhead. This overhead is heat-exchanged for subcooling and returns to the reflux accumulator partially condensed, the liquid is pumped to the depentonizer and the vapors enter the recompressor system.

The hot oil from the bottom of the high-pressure still flows at 15 p.s.i. to a low-pressure still and is steam-stripped to an i.b.p. of 470° F., and the hot lean oil is cooled for entry into the lean-oil storage tank. The absorption oil (41.2 A.P.I.) is kept at an e.p. of about 625° F. by shunting a small stream through a reclaimer still supplied by a large quantity of stripping steam.

The fractionating system consists of five columns. The general plan of fractionation is as follows: Isopentane and lighter are first separated from the 400° F. raw gasoline in the depentonizer. The over-head containing some n-pentane and hexanes passes the four other columns where it is successively deprived of ethane, propane, butane and pentane; the pentanes and last column bottoms plus bottoms from the depentonizer make a deisopentanized 400-e.p. gasoline, which is pumped through heat exchangers to a 40-tray depentonizer at 145 p.s.i. and a top temperature of about 175° F. The bottom temperature is kept at 422° F. by the depentonizer furnaces. After heat exchange the bottoms pass direct to storage; the overhead is cooled and goes into the reflux accumulator from which a small amount of gas goes to the low-pressure absorber.

From the depentonizer accumulator the liquid is heat-exchanged and passes into a 30-tray deethanizer operating at 400 p.s.i. and a top temperature of 135° F. The overhead passes into a reflux accumulator and all condensed liquid is returned as reflux to the column; the gas goes to the appropriate recompressor system. The bottom flows from the reboiler to the feed tank of the depropanizer, where propane is taken overhead at 245 p.s.i. and a top temperature of 124° F.

The bottoms from the depropanizer flow into a 40-tray debutanizer operating at 100 p.s.i. and a top temperature of 133° F., with a reboiler temperature of about 225° F. The bottoms from the debutanizer are pressured into a 60-tray deisopropanizer at 55 p.s.i. and a top temperature of 174° F., and deliver an overhead of isopentane more than 95 per cent pure. The reboiler temperature is about 205° F.

The isopentane, mixed butanes and the 400-i.b.p. distillate streams are each metered through two positive displacement meters in series. The three streams flow through back-pressure regulators to a common header into a refrigeration vacuum flash drum for cooling to 55° F. The vapors go from here to the refrigeration recompressor system and are returned through a condenser to the flash drum. The cooled liquid is stored as No. 1 product, which is batch-shipped through a pipe line to the refinery. The atmospheric storage tanks are provided with vapor recovery systems; the vapors are recompressed to 45 p.s.i. and returned to their respective tanks.

The deisopentanizer and depentanizer bottoms are combined to form a 400-e.p. gasoline, which is No. 2 product and is shipped by barge. Facilities for tank-car shipment of propane are being provided.

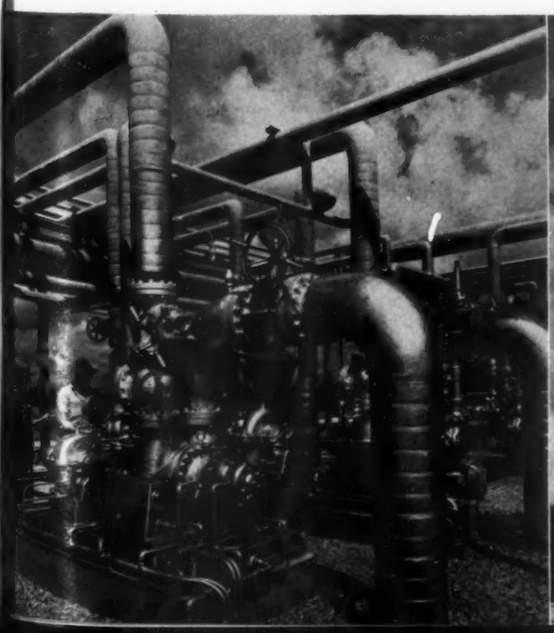
About 11,000,000 cu. ft. of gas per day are required to fuel the plant and field, of which about 6,500,000 cu. ft. are supplied by the residue gas from the low-pressure absorber, the rest from the 400-p.s.i. recompressor system. Steam for power and process requirements are supplied at the rate of about 95,000 lbs. per hour at 235 p.s.i. by three 480-h.p. water-tube boilers. Exhaust steam from the turbines and reciprocating pumps serves for stripping and reboiling. The boiler plant is operating with about 80 per cent return condensate. Feed water is softened by hot-process lime-soda treatment. Electricity is supplied to the plant and the cottage area by two 75-K.W. 680-volt generators.

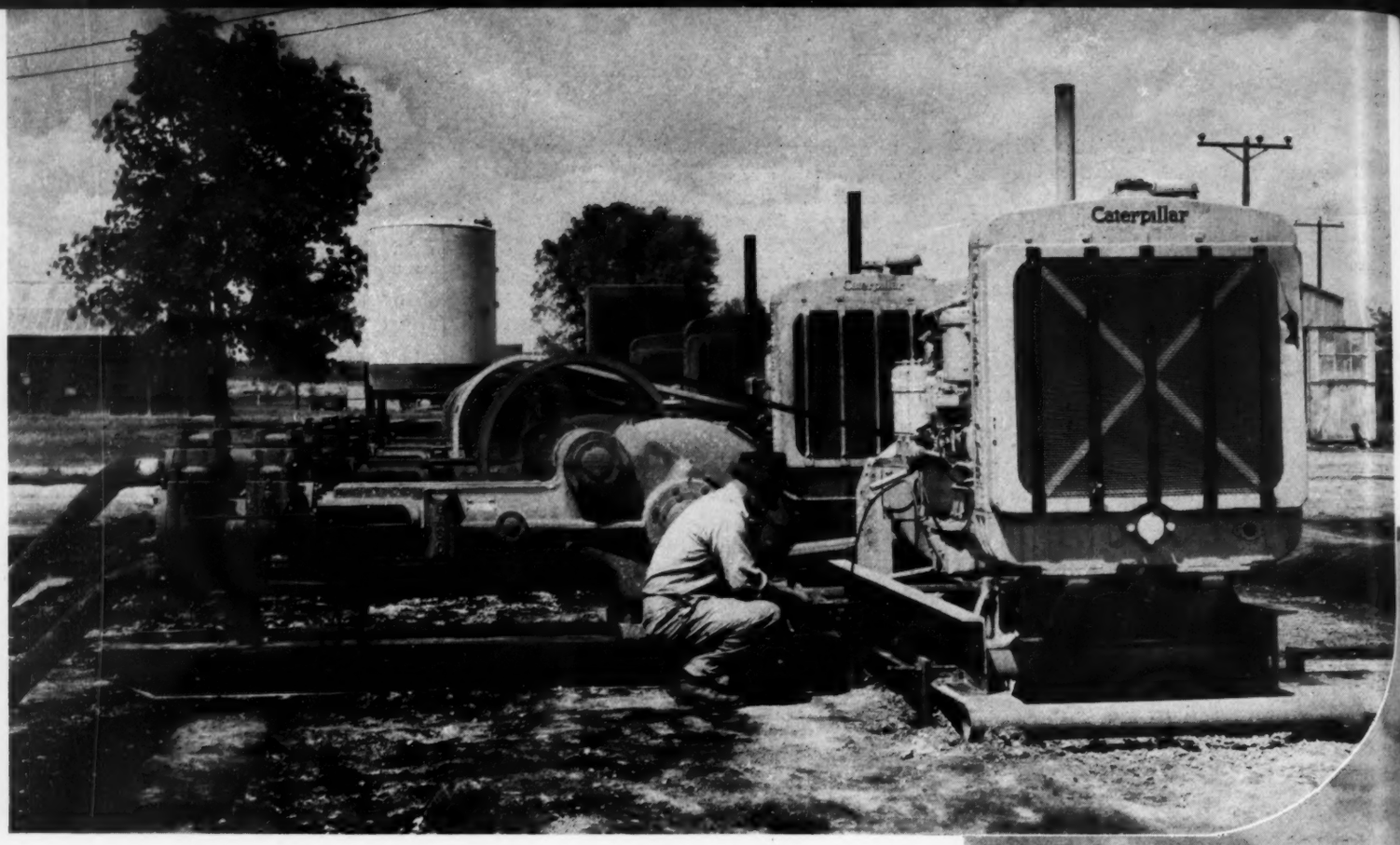
Well water is supplied at the rate of about 6,000 g.p.m. from four wells completed in the same sand at 290 feet. This water has a temperature of 71° F. and is used for low temperature cooling and condensing. There is a 660 x 24 x 58-ft. cooling tower which handles about 20,000 g.p.m. This tower has an effective area of 66,200 sq. ft. and releases about 240,000,000 B. T. U. per hour.

Due to the low elevation of the site, its nearness to the coast and the danger of flooding from seasonal hurricanes the plant area is enclosed by a 3-ft. dike. Provision is made for drainage by pumps in case of high water.

The fire-fighting system includes 45 fire hydrants through the plant area; fog nozzles are provided at strategic points and a centrifugal fire pump is kept in readiness at the boiler plant. Foamite carts are installed in each of 10 areas and numerous 2½ gal. foamite cylinders are available nearly everywhere.

Eight of the buildings are of steel frame constructions covered with corrugated transite; two are of frame construction, also covered with transite; the remainder are of frame construction covered with asbestos siding and asphalt roof shingles.

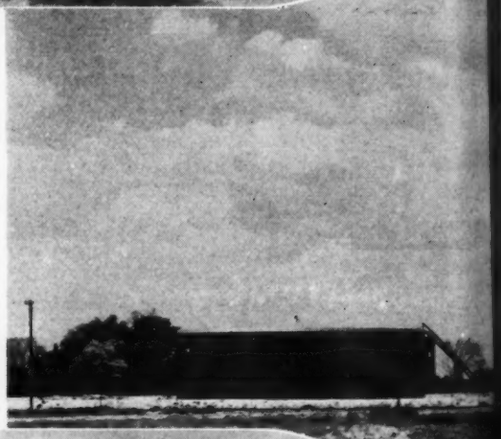




Flexibility is Provided at this Salem, Illinois, Installation of Sohio Pipe Line Company, by Using Five Diesel Driven Pumps, Each Capable of Pumping 225 Barrels Crude per Hour at a Fuel Cost of 7.5 Cents.

SOHIO USES UNIT TYPE PUMPING EQUIPMENT ON ILLINOIS CRUDE LINE

Below: Another View of Unit Type Station Pumping Illinois Crude to Ohio Refineries.



Right: General View of Salem Field Showing Types of Pumps Employed at the Well.

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Right Below: Two Gas Engines and Five Diesels are Used at this Unit Type Sohio Station. All are Driving 5 x 10 Pipeline Pumps.

Photos Courtesy Caterpillar Tractor Co.

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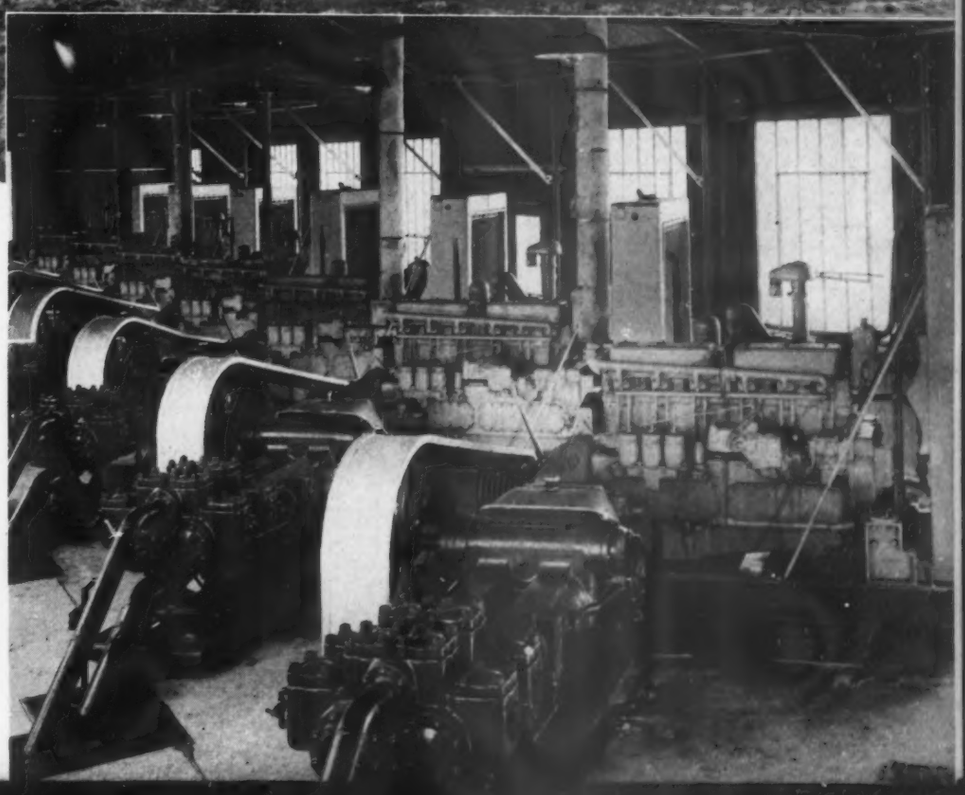

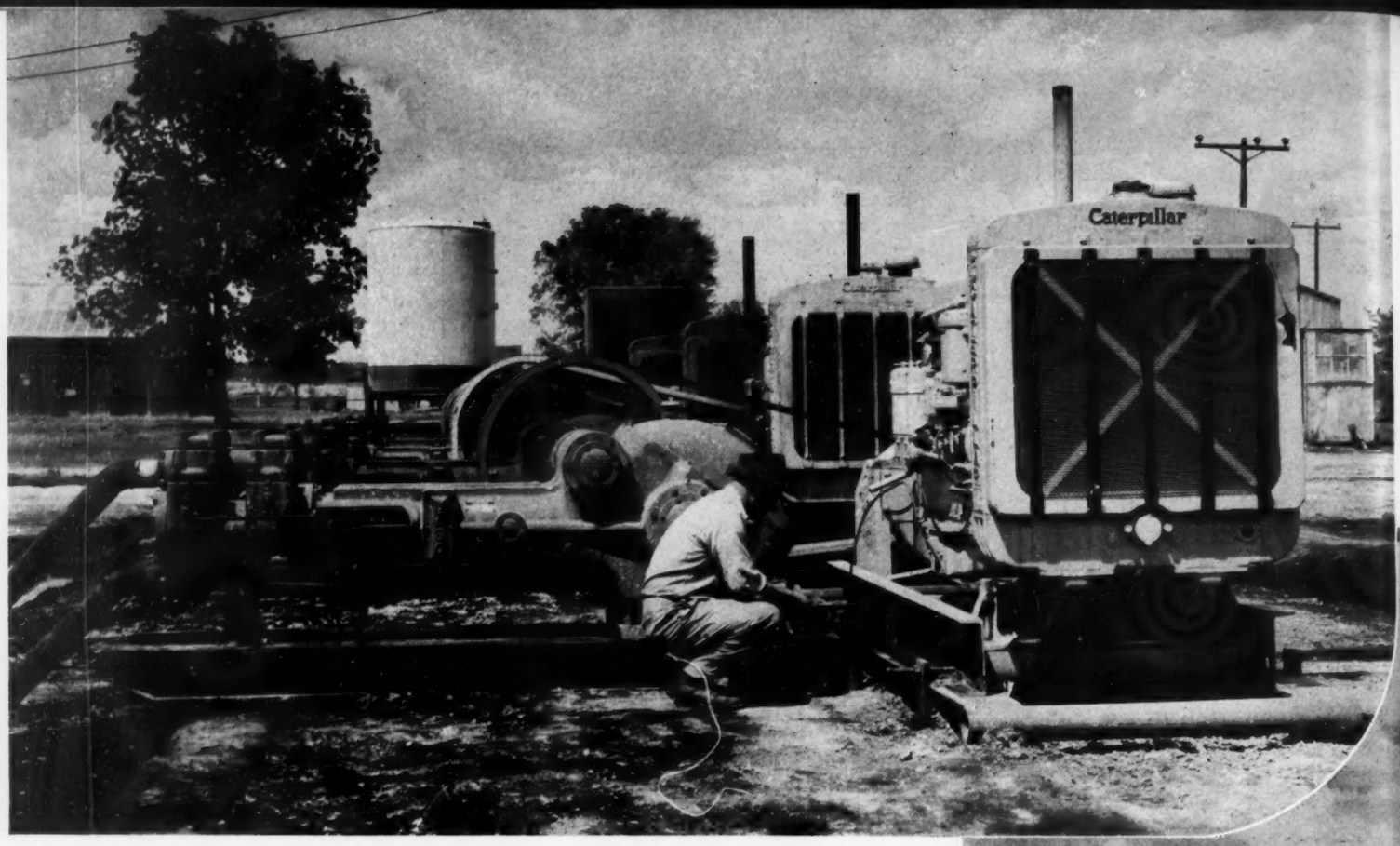

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T. C. Knoop Jr., Public Relations Officer, Interstate Oil Compact Commission.

COOPERATIVE STATE ACTION PROVIDES INDUSTRY'S ANSWER TO FEDERAL CONTROL

By T. C. Knoop, Jr.*

In Ten Years of Operation The Interstate Oil Compact Has Become A Strong Force for Conservation and Has Demonstrated the Capacity of State Representatives Working Together to Deal Constructively With the Problems of Regulated Operation

Andrew F. Schoeppel, Chairman of Commission.

WITH the Anglo-American oil agreement revised to meet the objections against reposing mandatory authority in a body far removed from direct contact with industry operations and with its complementary proposal for an international commission to represent all nations concerned with international oil trade it is interesting to note that both these proposals follow the model of an organization that has demonstrated its value through ten years of existence within the United States. The Interstate Oil Compact Commission, with no mandatory powers but with a steadily growing influence in preventing the waste of vital national resources and encouraging sound and fair regulatory practices has proved its capacity to serve the states, the nation and the oil industry itself without departing from democratic methods.

In view of the importance of the issues now before the oil industry — domestic and international — it seems worth while to review the record and to attempt an answer to the question — "What manner of bird is this goose that lays golden eggs for an industry possessed of so much gold of its own, albeit black?"

Let's take a look.

The petroleum industry will not soon forget the turbulent days of the early thirties. Vast new reserves of oil had been discovered and the market was found lacking in ability to absorb the mounting stores of above ground supplies. Storage tanks bulged; pipelines frantically spouted their laden goods; oil field pumps, those nodding iron men of the oil industry, relentlessly added to the dislocation of the balance between supply and demand; the sustaining; lifegiving monetary considerations faded farther and farther from view and the great petroleum industry was hanging on the ropes.

During this chaotic period, when the demoralizing effect of overproduction had descended like an ominous cloud over the petroleum industry of the United States and pleas for remedial measures resounded throughout the nation, there came into being an agency that stemmed from the people — the Interstate Oil Compact Commission.

In November, 1934, Congressman E. W. Marland, then governor-elect of Oklahoma and founder of the Marland Oil Company, now the Continental Oil Company, called a conference of the governors and governors-elect of the oil producing states for the avowed purpose of formulating an interstate agreement that would bridge the 'no-man's land' in regulation which existed between the states individually and between state and federal governments.

Responding to his invitation, there gathered in Marland's mansion at Ponca City, the then so-called "Autumn Capital" of Oklahoma, Governors James V. Allred of Texas, Alf M. Landon of Kansas, and Marland; Patrick J. Hurley, attorney, oil men, and former Secretary of War under President Hoover; Northcutt Ely, legal advisor to the Federal Oil Conservation Board, the Cole Committee, and other observers.

At this conference little visible progress was made and a second meeting was held in Ponca City beginning January 3, 1935, which was attended by representatives of eight of the oil producing states. Although no agreement was reached as to the provisions of the proposed oil compact, much progress was made in the establishment of a better understanding among representatives of various states.

Following these preliminary conferences, there assembled in Dallas, Texas, in February, 1935, governors or representatives of the states of Oklahoma, Texas, Arkansas, California, New Mexico, Colorado, Illinois, Michigan, and Kansas to finalize the provisions of an interstate commission which would function as a coordinating agency in consolidating state effort in conserving those two vital, irreplaceable natural resources, oil and gas.

The deliberations of the delegates to that conference continued through several days. At their conclusion the provisions of "An Interstate Compact to Conserve Oil and Gas" had been agreed upon and the states of Oklahoma, Texas, California, and New Mexico executed the agreement while the representatives of the other states present recommended the ratification of the treaty agreement to their governors and legislatures. New Mexico's legislature immediately ratified the agreement for a two year period, followed by Oklahoma, Kansas, Colorado, Illinois, and Texas, and a new era in colaboration was born.

After the six charter members approved the agreement, the provision of Article VI thereof, which directs that "Each state joining herein shall appoint one representative to a commission hereby constituted and designated as 'The Interstate Oil Compact Commission' . . ." was vitalized and such a commission appointed by the governors of the signatory states.

A headquarters was established in the Capitol at Oklahoma City, where it has since remained, and a fulltime paid secretary and staff were employed to conduct administrative affairs.

The framers of the constitution of the interstate oil compact declared in the plainest of language that, "The purpose of this compact is to conserve oil and gas by the prevention of physical waste thereof from any cause."

With that simple declaration as a basis, the governors and state representatives comprising

*Public Relations Officer IOCC

Gov. Robert S. Kerr, Oklahoma's Representative on the Commission and Member of the Executive Committee.

J. C. Hunter, Texas, First Vice-Chairman and Member of the Executive Committee.

Hiram M. Dow, New Mexico's Representative on the Commission and Member of the Executive Committee.

Sam H. Jones, Louisiana's Member on the Commission and Member of the Executive Committee.

the membership of the Compact Commission, embarked on a nation-wide program of promoting and encouraging sound conservation, by the states, of oil and gas.

To best accomplish that purpose, the Commission sought first to enlighten, itself on all phases of oil and gas production and conservation, and then make such authoritative information available to the states, the industry and the public.

However, all was not peace and harmony for the Compact in its early life. States looked with suspicion upon other states; motives were scrutinized, intentions questioned, and information jealously guarded. But the men of wisdom and foresight guiding the destiny of the Compact despaired not.

In order to consolidate the various positions of its members and to reconcile their divergent opinions as to the principles and practices constituting true conservation, study committees on cooperation, coordination, and consumption were appointed with memberships composed of outstanding men from the industry and regulatory bodies. The reports of these pioneer committees were studied, augmented and approved by the Commission and then disseminated to the public.

Quarterly meetings of the Commission, open to the public, were inaugurated and held regularly throughout the oil producing states. To these open forums the representatives of the states and the industry brought their individual problems where they were frankly and publicly discussed and solutions earnestly sought.

Under the influence of this meeting across the conference table, men became less distrustful of each other, state attitudes took on a deeper tone of understanding, a community of interest was realized and the Interstate Oil Compact Commission was on its way.

During the ten years since its formation, the Commission has had four chairmen. Governor Marland, rightly regarded as the man who stimulated its inception, was the Compact's first chairman and served two years. The State of Texas, greatest oil producing state in the Union, provided the second chairman in the person of Colonel Ernest O. Thompson, then chairman of the Texas Railroad Commission and still one of its three members, who held the chairmanship for three years. Oklahoma's Governor Leon C. Phillips succeeded him for a like period. Governor Andrew F. Schoeppel of Kansas was elected chairman in December, 1942, and is now rounding out his third year at the Compact's helm.

The Commission's executive committee, the directive group of the Compact, meets once each month and conducts the Commission's routine business affairs. It makes studies and recommends policies and procedures to the whole Commission. This five member committee is presently composed of Governor Schoeppel, chairman, Governor Robert S. Kerr of Oklahoma, former governor Sam H. Jones of Louisiana, Hiram M. Dow of New Mexico, and J. C. Hunter of Texas.

The Commission receives its financial support from voluntary contributions by the member states. It is wholly dependent upon state sovereignty for vitalization of its recommendations by public officials of its respective member states. It carries on its mission as a consulting and advisory body without any power of compulsion. It issues no directives and has never sought arbitrarily to impose its will upon any state. Its only force is that of enlightened public opinion. It has become recognized as a working example of successful voluntary interstate cooperation in the guidance of a most important industry in a thoroughly democratic manner.

Any oil producing state may join the Compact by receiving local legislative authorization and signing and depositing with the Secretary of State of the United States a counterpart of the original agreement. It is a significant fact that since its creation in 1935, not a single state has sought to exercise its right of withdrawal. To the contrary, the Compact's initial membership of six states has been nearly trebled by the addition of the states of Arkansas, Louisiana, Michigan, New York, Pennsylvania, Kentucky, Ohio, Montana, West Virginia, Florida, and Alabama. The seventeen states constituting the Compact's membership produce approximately 90 percent of the natural gas and 80 percent of the crude oil that is produced each day in the United States.

Compact's Engineering Committee, Left to Right Standing: N. W. Shiarella, Kentucky; S. F. Peterson, Illinois; Alec M. Crowell, Mississippi; F. R. Rye, Michigan; Seated: Dr. Eugene A. Stephenson, Kansas; John M. Kelly, New Mexico; Dr. E. DeGolyer, Chairman, Dallas, Texas; Dr. W. H. Carson, Oklahoma; and Dr. F. M. Van Tuyl, Colorado.

Regulatory Practices Committee, Standing Left to Right: S. F. Peterson, Illinois; O. C. Baily, Arkansas; L. B. Taylor, Kansas; J. B. Wilson, Secretary, Oklahoma. Seated Left to Right: Olin Culberson, Texas; Ray O. Weems, Oklahoma; Theo Morgan, Chairman, Kansas; Glenn Staley, New Mexico.

Research and Coordinating Committee, Left to Right: L. B. Taylor, Chairman, Kansas; Ludwig Schmidt, Bureau of Mines, Oklahoma; Walker T. Pound, Oklahoma; E. G. Dahlgren, Oklahoma; Samuel F. Peterson, Illinois; F. R. Frye, Michigan.

The Compact agreement has been regularly renewed and extended without provisional change except as to expiration date. Under its terms it will be subject to extension by the states and congress in September, 1947, its present date of expiration.

Excepting its formative period, the Compact has been remarkably free from internal strife and dissension. Official action is taken by the Commission only after thorough discussion and affirmative vote of the members, each state having one vote and a majority ruling. Practically every official act of the Commission has been taken with the unanimous consent of the whole body.

The results of the work of the Compact Commission and its committees reach into nearly every state in the Union. With its reports, surveys, findings, recommendations and other information going regularly to the thousands of persons on its mailing lists, the Commission awakens the public consciousness and the state legislative mind to the importance of conservation in the production of oil and gas and the careful preservation of the nation's underground reserves.

The Commission has constantly sought to widen its scope and expand its activities and influence. By the appointment of permanent working committees with memberships composed of outstanding technical and professional men,, it has been enabled to conduct inquiries, surveys, and studies of conditions affecting the oil and gas industries which have been of inestimable value to the Commission in formulating its findings and making its recommendations to the states.

Some of the committees, and the valuable contributions they have made to the conservation program throughout the nation, are here mentioned as deserving special notice.

The Legal Committee, consisting of a member from each compacting state, has made a very comprehensive study of the oil and gas conservation laws of the various states and submitted to the Commission, after exhaustive research and preparation and has suggested forms of laws which are recommended by the Commission to all oil producing states. Many states have already adopted the principles contained in the suggested laws and they have become recognized as a most valuable aid in effecting uniformity in state regulatory acts. They are published in printed form and available for free distribution at the Compact headquarters;

The Regulatory Practices Committee, composed of one member from each of the compacting states — usually a representative of the state regulatory body — has conducted a study of the rules and regulations of the regulatory bodies of the states and submitted to the Commission suggested model rules and regulations for recommendation to the states by the Compact as standards for general application;

The Research and Coordinating Committee, composed of technical experts from the member states, conducts special surveys and studies, such as its two National Stripper Well Surveys (a third such survey is currently being conducted) and its recent survey of the Administration of Oil and Gas Conservation Laws in the member states, and is now occupied with a study of statistics in the various states pertaining to natural gas;

The Engineering Committee, with membership composed of outstanding petroleum engineers has under way a thorough, nation-wide survey of production practices which is the first such survey ever undertaken, and which, when completed, will include recent advances in production practices and a complete study of oil reservoirs;

The Interstate Relations Committee, a nine-membership committee on interstate affairs, studies practical methods of enhancing the Compact's relations with the states, the federal government and the public, and has prepared for distribution by the Commission a simplified handbook, abundantly illustrated, on oil and gas conservation.

The Economics Advisory Committee, composed of four nationally known petroleum economists, keeps the Commission constantly advised on economic factors relating to the production and conservation of oil and gas;

The Public Lands Committee, conducts studies and inquiries and keeps the Commission informed on all matters and activities having to do with the production and conservation of oil and gas in the public domain.

The Industry Advisory Committees are composed of representatives from each of the principle oil and gas association in the United States, appointed to work in cooperation with the Commission in effecting a sound conservation program throughout the nation.

These and other special and permanent committees are constantly at work under the direction of the Commission and are the vitalizing factors behind the Compact's growth and expansion.

The Commission continues to meet regularly each quarter in various of the oil producing states. At these meetings, open to the public and widely attended by members of the industry and state and federal officials, the Commission considers the problems of the states and the industry. The nation's foremost authorities on the subjects coming before the meetings appear on the program and by their papers,

Members of the Compact's Legal Committee, Standing Left to Right: C. A. O'Niell, Jr., Louisiana; E. J. Coyle, Illinois; R. B. McEntire, Kansas. Seated: Chas. H. Jones, Ohio; W. C. Lawrence, New Mexico; Earl Foster, Chairman, Oklahoma; R. E. Hardwicke, Texas; and Hiram M. Dow, New Mexico.

addresses and discussions aid the Commission in its deliberations.

Through the medium of the open forum provided by these quarterly meetings, the problems of the states and industry are frankly reviewed and discussed. Here is provided a place where the best thinking is made available to all, even the smallest producer. Outstanding engineers and technicians of the industry are brought to the Commission's round-table where they present for discussion and for the information of the entire petroleum industry, the results of their private deliberations and studies, as well as the results of their experiments throughout the industry.

It is the ability of the Interstate Oil Compact Commission to conduct its affairs in accordance with the highest concepts of American democracy that has made it an organization unique among all others. It is unique because, in an era abounding with organizations and groups pledged to a specialty of effort and interest — producer groups for producers, consumer groups for consumers, local government groups for states righters, letter organizations for federalists, social welfare leagues, and societies for the protection of broken down milkwagon horses — the Compact Commission's interest is the interest of all groups, its representation of all classes. It transcends political faiths, obliterates state boundaries, it is sponsored by the oil and gas industries and their representative associations; has the approval of governors and state legislators, is sanctioned by the national congress and enthusiastically supported by those mediums of news dissemination, the press, radio and periodicals.

From the co-mingling of men in a common cause for the common good the Compact gains its strength and stability. Within the Compact there is but one purpose, one common desire — the conservation and protection of a natural resource. When the Compact Commission convenes around its conference table, personal ties and company connections become secondary to the common good. Political beliefs and the wraps of party affiliations are never worn within the Compact's deliberative chambers. When the Commission meets, the donkey and the elephant sit down to rest.

For more than a decade the Interstate Oil Compact Commission has constantly upheld and advocated those cardinal principles which proclaim the conservation of natural resources by the states to be a dominant factor in their proper production and use and at the same time a proper function of the states, yea, even an obligation, as trustees for the people in the protection of vital products of nature.

The Interstate Oil Compact is truly symbolic of American sovereignty — democratic in its every aspect. Even a provisional silhouette of its constitution spells out the word- — D-E-M-O-C-R-A-C-Y. Briefed, its charter looks like this.

Article I D-eclares how the agreement becomes effective.

Article II E-nunciates the purpose of the Compact — the conservation and prevention of waste of oil and gas.

Article III M-akes provision for the enactment by member states of adequate conservation laws.

Article IV O-utlaws the movement of oil in commerce produced in violation of valid state law, rules or regulation.

Article V C-ircumscribes the purpose of the Compact by emphatically stating it shall not be utilized to restrict the production of oil and gas, stabilize or fix price, create or perpetuate monopoly, or promote regimentation.

Article VI R-ecites the procedure for creating the "Interstate Oil Compact Commission", outlines its duties, prescribes its powers, and details its method of voting.

Article VII A-ssures each member state of freedom from financial responsibility because of membership or breach of the agreement's terms.

Article VIII C-onfers upon each member state the right of withdrawl and prescribes the method by which other oil producing states may become parties to the Compact.

Signatures, Y-penned, of governors and official representatives of signatory states, complete the outline.

There it is — The Interstate Oil Compact — standard bearer in the all-out attack on waste and its companion evils. Seventeen oil and gas producing states united in a common cause. Linked hand in hand with them in this worthy effort are other states, not members of the Compact but within whose borders towering steel derricks stand as monuments to the ingenuity and enterprise of adventuresome American men and women.

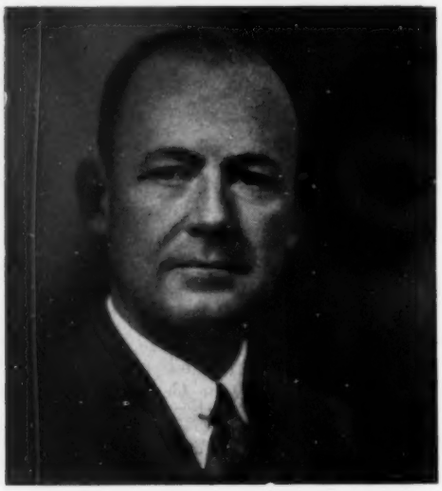
This, then, is "What manner of bird?"

The Anglo-American oil agreement has as its basis those fundamentals upon which the Interstate Oil Compact has risen to its present imposing stature — cooperative effort. Its only compulsory features appear to be that both nations must grant equal exploratory and development privileges and all existing legal concessions and lawfully acquired rights must be respected by both governments. Voluntary cooperative action dominates all other phases of the agreement.

Based upon these principles, and with utter freedom from force and compulsion, the agreement calls for the support of all peoples. The success and practicability of uncoerced action has been firmly established by the Interstate Oil Compact. Out of the experience of the Compact Commission has come one great lesson, one undeniable truth, which is that states can cooperate freely with one another and with private industry with good resulting to all. If such can be true of sovereign states, could it not apply likewise to nations?

Indeed it would appear that the Interstate Oil Compact — the domestic petroleum industry's goose of golden egg capacity — and the Anglo-American oil agreement — the international gander — are quite likely to develop into birds of a feather.

Oil Company Staff Changes



R. G. Follis

Brig. Gen. Walter B. Pyron

R. G. FOLLIS has been elected president of Standard Oil Company of California to succeed H. D. Collier who becomes chairman of the board of directors. Mr. Follis has been a vice president and director since 1942. A year ago he was also made assistant to President Collier.

Standard's new president is a native of San Francisco and a graduate of Princeton. He began his service with the company at the Richmond refinery in 1924. He was brought to the home offices at San Francisco in 1932 after serving in both Bakersfield and El Paso refineries. In 1940 he was made general manager of the manufacturing department.

Commenting on the election, President Collier said: "It has been my wish for some time to turn over the executive responsibilities of my position to a younger man, but due to the pressure of war this step necessarily had to be postponed.

"The strenuous problems of reconversion are now with us, and while I plan to remain active in working on these problems, I believe this is the appropriate time to transfer the operating burdens to others.

"Mr. Follis has served our company well for many years, and particularly during the war he demonstrated such a complete grasp of the companys' problems and its promises for the future as to win the extreme confidence of our entire organization, and to suggest him as the logical man to succeed me in the presidency. I am sure that with this enthusiastic support, our new president will provide the energies and abilities to develop still further the company's position in the community and in the industry."

BRIG. GENERAL WALTER B. PYRON, vice president of Gulf Oil Corporation, who has been on active service with the Army since the start of the war, has received his discharge and will return to the company's service on January 1. Gen. Pyron will be located in London and will be in charge of all Gulf producing operations in Europe and the Middle East. During the war, Gen. Pyron was stationed in Washington where he was chairman of the executive committee of the Planning Division of the Army-Navy Petroleum Board acting as coordinator of fuel supplies. For outstanding service in this position he was awarded the Legion of Merit. Before the war he was in charge of Gulf's production activities in the Southwest with headquarters at Houston.

DONALD G. GILL, advertising and sales promotion manager of National Refining Co., Cleveland, before the war recently has been released from the Navy and has joined the Duane Jones Company in New York. Gill's final rank was Lieutenant Commander.

GAGE LUND has been elected chairman of the boards of The California Company and Standard Oil Company of Texas, both Standard of California subsidiaries.

K. H. Crandall was named president of The California Company, succeeding Lund, while J. W. Hoover was elected a vice president.

Lund's headquarters will be in San Francisco. Operating headquarters of Standard of Texas is in Houston and The California Company, in New Orleans.

R. M. DEANESLEY, recently with M. W. Kellogg Company and Kellex Corporation, has joined the research staff of Universal Oil Products Company. He will be in charge of a new department which is being established in the company's Riverside laboratories. While with Kellex he worked on the separation of U-235 by gaseous diflusion.

Born in England and educated at Oxford and at University College, London, Mr. Deanesley has had extensive experience in the petroleum industry, especially in the light hydrocarbon field, having been associated with Shell Development Company for 15 years before joining Kellogg.

His work included catalytic processes related to the production of aviation gasoline; also development of processes for the chlorination, sulfation and hydration of hydrocarbons, and azeotropic rectification.

APPOINTMENT of Robert V. Kerley as director of aeronautical research for Ethyl Corporation is announced by Earl Bartholomew, general manager of Ethyl Research Laboratories. He succeeds S. D. Heron, who is retiring from active supervision of aeronautical research but who will remain with Ethyl as a special consultant.

Mr. Kerley has been a civilian engineer with the Engineering Division of the U. S. Army Air Forces at Wright Field, Dayton, since 1932 and chief of the fuel and oil branch, power plant laboratory of the Air Technical Service Command since 1936.

HENRY H. HEWETSON, who started his career in the oil business as a student engineer shoveling coal as a stoker in a refinery, was elected president of Imperial Oil Limited, Canadian affiliate of Standard Oil Company (N. J.) at a meeting on October 17. He succeeds the late

Henry H. Hewetson

FACTS YOU SHOULD KNOW ABOUT U.O.P.

The service that Universal Oil Products Company offers is so broad in scope that not everyone realizes its extent and the importance of each of its activities.

Top management may think of us only as the originators and licensors of its refining processes. Engineers may tell you that we design refinery equipment. Operators and maintenance men may know us primarily as a servicing and inspection organization. The fact is, we're all of these . . . and more. Here, in brief, is a resumé of the services which UOP offers to the Petroleum Industry.

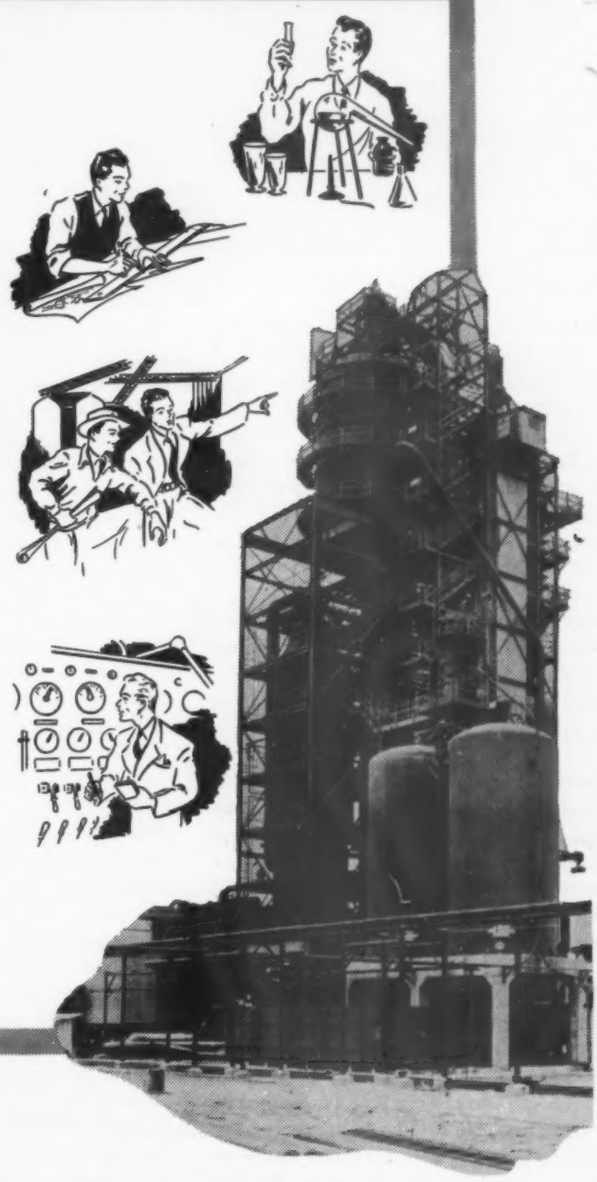
PROCESSES: We are constantly engaged in research and experimentation to improve the processes of petroleum refining. Universal scientists have been responsible for many of the major improvements in modern refining processes including thermal cracking, catalytic cracking, polymerization, alkylation, isomerization, hydrogenation, dehydrogenation, and others. The processes which we develop are available to all refiners.

ENGINEERING: In order to assure proper results from the processes which we develop, we assume full responsibility for the design of all necessary equipment.

SUPERVISION: While we do no construction ourselves, we do provide competent engineers who devote their time to careful inspection of the construction and erection of the equipment which we design.

SERVICING: Once the plant is on stream, one of our most important activities . . . Servicing . . . starts operation. This includes, first, an intensive training program to impart to operating men an exact knowledge of the operation of the new equipment. Second, we send expert operating men periodically to the licensee's refinery to check yield and render counsel and advice. Third, we maintain a most efficient inspection organization composed of specially trained men who are continually in the field making physical inspection of licensed units and recommending such steps as may be necessary to insure continued high efficiency.

Thus, not only does Universal provide the original process and live with the job until it is on stream, but continues to maintain a lifetime interest in its efficient, economical operation.



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UNIVERSAL SERVICE PROTECTS YOUR REFINERY

F. B. Bimel

Philo Maier

Major B. A. Hardey

R. V. LeSueur, president and chairman of the board of directors, who died September 6.

At the same time, Imperial elected Frank W. Pierce of New York, a director, to be chairman of the board of directors. Mr. Pierce also is a member of the board of Standard Oil Company (N. J.) J. R. White, director, was elected a vice president and will succeed C. A. Eames, who will retire shortly. F. G. Hall, general sales manager, was elected to the board of directors.

Mr. Hewetson turned to the oil business after World War I when he completed service as a flier in the Royal Air Force. He was taken on by Imperial to pursue a student's course and his first lesson came in stoking a coal-burning still in a refinery. His next job was in the research laboratories where his duties were to wash and polish retorts. His pursuit of chemistry later won him a membership in the American Institute of Chemical Engineers.

After service with research and manufacturing departments of various Jersey Standard affiliates in the United States and Latin America, Mr. Hewetson moved to the sales division of Imperial in 1935 and became a vice president in 1940.

Mr. Pierce, a graduate of Cornell University in mechanical engineering, joined the Jersey Standard organization in 1924. During subsequent years he was particularly identified with employee relations plans and policies of the company. He became a director of the Jersey company in 1942 and joined Imperial's board in 1943.

Mr. White, a native of London, Ontario, is a graduate in engineering of the University of Toronto. He was originally employed at Sarnia as a draftsman and engineer and later was transferred to South America where he worked in several capacities. He became a director of Imperial Oil last April. Mr. Hall is a native of Toronto and joined the company as an office boy in 1912. He was recently appointed general sales manager.

F. B. BIMEL has been elected chairman of the board and Philo Maier president of International Petroleum Company, Ltd. Both offices formerly were held by the late R. V. LeSueur. The directors also elected Paul Lambright and B. A. Myers vice presidents.

Mr. Bimel has been a director of International Petroleum since 1928 and was made a vice president in 1944. Mr. Maier formerly was chief engineer and later president of the Andian National Corporation which operates a pipe line in Colombia. He has been a resident of Toronto for many years but has spent a considerable part of his time in South America. Mr. Lambright has had world-wide experience in oil production. He began his career in the United States and served subsequently in Argentina, Sumatra, Romania and the Northwest Territories. At the time of the Nazi invasion of Romania he was manager of the Romano Americana Oil Company at Bucharest and narrowly escaped arrest. He has recently been in South America for International Petroleum. Mr. Myers became associated with International Petroleum through Tropical Oil Company, a subsidiary, and became a director in 1936. He has had wide experience in producing and drilling and has lived in Venezuela, Colombia and Peru.

MAJOR B. A. HARDEY, newly elected president of the Independent Petroleum Association, has been active in the petroleum industry during his entire business career. He is a resident of Shreveport and an independent producer in Louisiana. He was born in Evangeline Parish and entered the oil business in 1912 directly following the completion of his engineering studies at the University of Texas. In 1914 he went to Shreveport where he was a member of the production department of Gulf Refining Company. He resigned in 1925 to take part in the organization of United Gas Corporation and subsequently served as executive vice president of the corporation's subsidiaries for six years. He was one of the organizers of Republic Gas Corporation, which firm has been particularly active in the development of gas production in the Hugoton area of Southwest Kansas.

In 1932. Mr. Hardey resigned to enter the petroleum business as an independent, and with associates carried on an oil well drilling contracting enterprise. As a result of the activity of this firm, production was established and Hardey became an active independent producer of crude oil.

In addition to directing his own business Hardey has found time to serve on the District 3 Production Committee of Petroleum Industry War Council. He is also a member of National Crude Oil Advisory Committee. He has served on the Interstate Oil Compact Committee, representing Louisiana. He served as state conservation officer of Louisiana under appointment by Governor Sam Jones in 1940, during the period of the state's reorganization of its petroleum conservation policies. In 1941 Hardey was asked by the Governor to take the chairmanship of the State Mineral Board, a position which he still holds.

W. W. ANDERSON, export manager for Oil Well Supply Company, has retired after 44 years with the company. Although he has been on pension for several years he stayed on the job because of the war emergency. Mr. Anderson was made export manager in 1907. In later years he was secretary of the company as well.

D. L. HOOKER has been appointed vice chairman of the Manufacturing Committee of the Socony-Vacuum Oil Company, Inc., according to an announcement by Clark S. Teitsworth, chairman. George S. Dunham, manager of the refinery engineering department, will represent the midwest refineries on the committee. Other appointments were those of J. M. Middleton to the manufacturing committee as manager of foreign refinery operations and S. D. Dalton as chief refinery engineer.

(*Continued on page* 90)

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★ ★ ECHOES FROM THE WASHINGTON OIL FRONT ★ ★

By W. J. Maddox, *Chief of World Petroleum Washington Bureau*

PIWC Successor Considered

W. Alton Jones

WARTIME cooperation between the oil industry and government proved so successful that industry now is taking the initiative in trying to work out a peacetime substitute for PIWC to keep alive the spirit of intra-industry unity perfected in the war effort, without falling afoul of the anti-trust law. Such an industry agency would be purely consultative and act for it in cooperation with the government.

A programming committee of 23 oil executives, headed by W. Alton Jones, president of Cities Service, is at work on the problem and is expected to report the results at the next meeting of PIWC, December 11. The committee's instruction were "to pursue the widest latitude in its exploration and consideration of any and all avenues which approach a plan of industrial mobilization by which the oil industry can serve the national welfare as effectively in peace as it did as a working partner of the federal government in war".

Oil Pact Meritorious

WITH the clean bill of health given it by PIWC's National Oil Policy Committee, the Anglo-American petroleum agreement signed in London in September is expected to win reasonably prompt approval from the Senate. A dissenting reaction comes from Austin, Texas, where Chairman Olin Culberson of the Texas Railroad Commission claims that the change of a word in the pact between the time it was released for publication and its submission to the Senate by the President gives Great Britain a big advantage over American oil companies.

Culberson says the published text stipulated that all British colonies and all American territories should be included in the agreement. The word "those" was substituted for "all", he claims, and as a result "only those territories contained in a list exchanged with the United States government are affected. Burma and Kuwait on the Persian are omitted from the British list accompanying the treaty".

PIWC has formally adopted the findings of its National Oil Policy Committee that the treaty is "meritorious and warrants accelerated action by the Senate". According to its announcement, PIWC "sweepingly supported" the committee's stand that the pact "will result in the establishment of machinery for effective and equitable solution of petroleum problems encountered in the progress of international trade, and, therefore, will be advantageous to Great Britain and America, their nationals and to the oil industry of both countries."

Chairman Tom Connally of the Senate Foreign Relations Committee is expected to go along with industry and the Administration on the revised draft of the treaty. It will be recalled that he balked at the original pact and pigeonholed it without a hearing.

Praise for PAW

Clarence Cannon

PAW still has its sights set on December 31 as the date it expects to pass out of the picture. Deputy Administrator Ralph Davies told the House Appropriations Committee the other day that by the end of this year more than 95 percent of the 978 employees who were on the rolls V-J Day will be out. The committee also learned that PAW expects to return $1,800,000 of its funds appropriated for the current fiscal year to the Treasury.

Davies estimates that only about 15 employees will be needed to put the finishing touches on folding up the agency between December 31 and the end of the fiscal year, June 30, unless the clean-up job is not transferred to a "central liquidating or permanent peacetime agency".

Chairman Clarence Cannon, perhaps unwittingly, paid a high tribute to the oil industry when he paused to remark: "I would like to say that there was no more essential activity or agency in the war than the Petroleum Administration. It did a wonderful job. All of our war machinery of every character, on land, sea, and in the air, absolutely depended on fuel, and so far as I have been able to find out there never was a case where any of the units were immobilized for lack of gasoline or lack of fuel, nor was there any time when any of our forces were inconvenienced for lack of petroleum products."

Oil men say the answer is that PAW was staffed by the industry, almost 100 percent, from Davies down.

Foreign Transactions Freed

PAW's lifting of restrictions over foreign supply and transportation turns back into normal commercial channels all transactions in the petroleum field, subject only to whatever domestic controls may be imposed by individual foreign governments. Its Directive 70, under which the controls were issued, however, is being retained temporarily to permit completion of programs and shipments already instituted, but, according to Deputy Administrator Davies, not later than December 31.

Discontinued are the Foreign Operating Committee's subcommittees, which, in cooperation with the Navy, War Shipping Administration and the British, have coordinated world wide tanker movements for the United Nations. WSA had notified PAW that enough tankers are now available to meet unrestricted world requirements.

Delay on Tidelands

Pat McCarran

CHAIRMAN Pat McCarran of the Senate Judiciary Committee is displaying some reluctance to start hearings on Joint Resolution 225, which was adopted by the House in September and renounces all claim by the federal government to State tidelands. After several false starts, he has now put off consideration of the legislation till January, and there is some thought that the hearings may be further deferred.

Consideration heat has been put on McCarran lately to hold off action on the tidelands resolution, it is understood. Some of it is reported to have been generated by Secretary of Interior Ickes who, as it is well known, has had his eye on the marginal oil fields.

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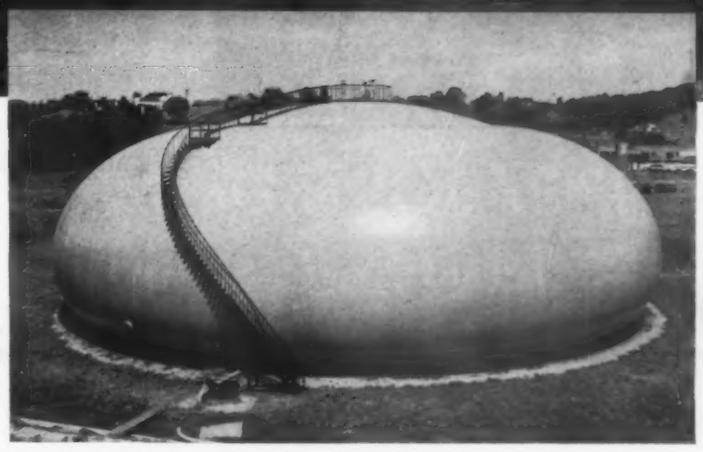

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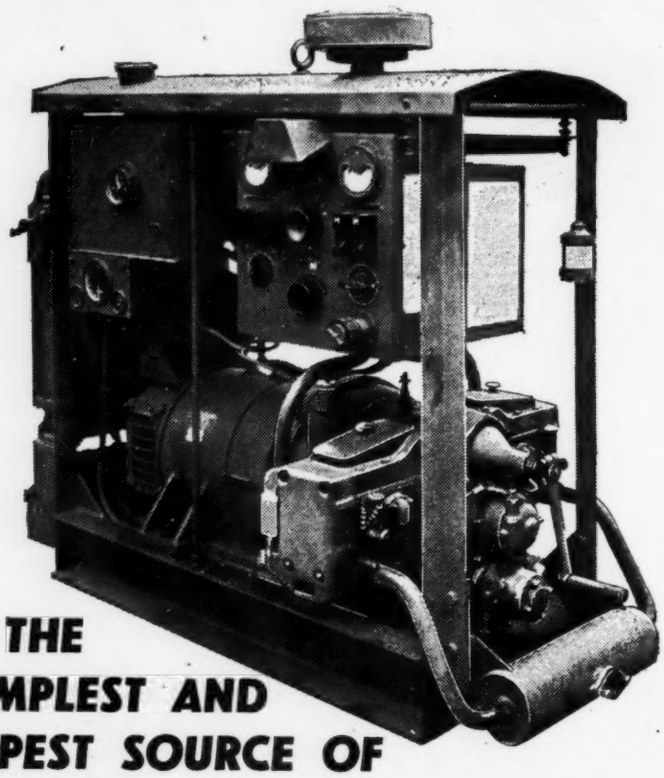
Acidizing Service in Venezuela

UNITED OILWELL SERVICE, S. A. of Caracas, Venezuela, has been organized to offer to the petroleum industry of Venezuela many of the services currently being performed by Dowell, Inc. of Tulsa, Oklahoma. The new company is licensed under Dow patents.

The first service which will be offered in Venezuela is the acidizing of oil wells. Laboratory tests indicate that very useful results may be obtained through the use of acid in improving the producing charactristics of wells in many of the Venezuelan fields. In the past this procedure has been tried to a limited extent in Venezuela, but the handling of acid in large quantities encountered transportation difficulties which prevented wide application. These difficulties have now been overcome, and arrangements have been made to ship the necessary quantities of acid to Venezuela.

The principal base of operations will be at Km. 100 on the Barcelona-SanTome Road, at which point United Oilwell Service is constructing a modern camp, laboratory, warehouse and shops, as well as storage facilities for acid. Later it is planned to extend operations to the Maracaibo area. As soon as possible the company will expand its services to include the use of plastics in water shut-offs, the use of the Dowell electric pilot for determining relative permeabilities in oil wells, water locating apparatus, and mud engineering.

The general offices of United Oilwell Service, S. A. are located in Caracas. Charles W. Fowler is president and general manager and Phil J. Lehnhard, formerly of Dowell, Inc. is chief engineer.



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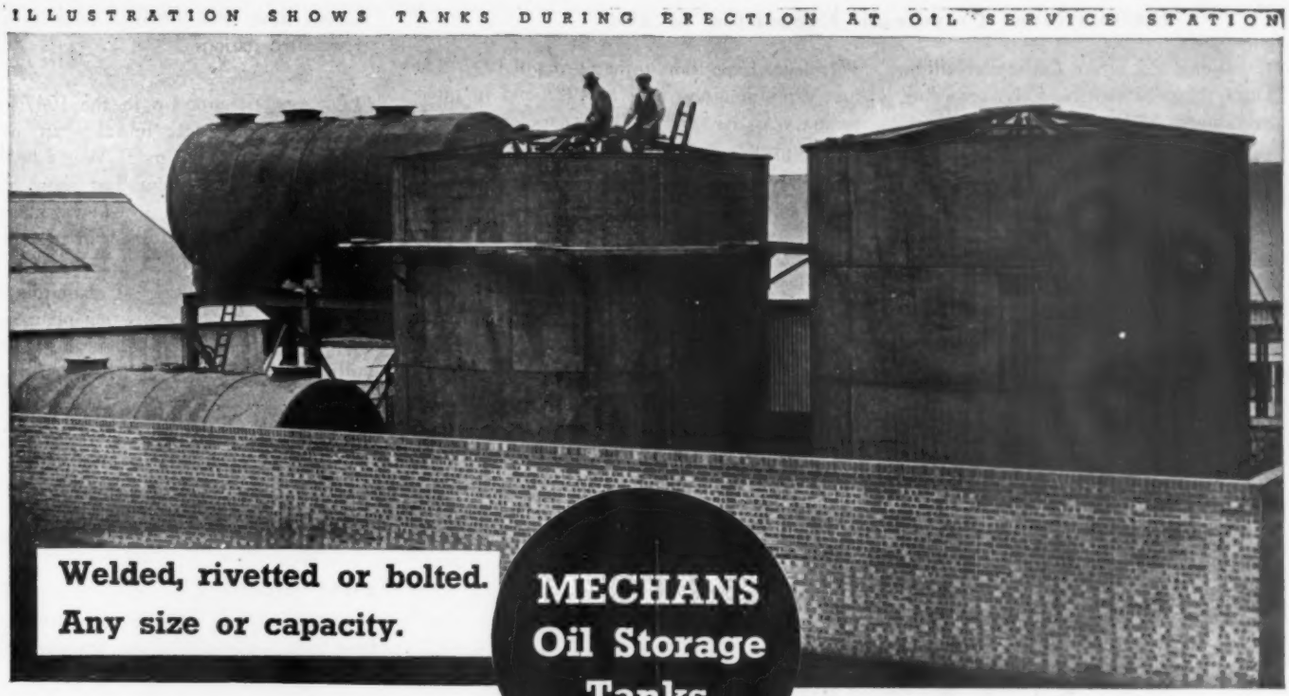
Romanian Oil in 1945

OFFICIAL figures on the activities of the Romanian oil industry for the first seven months of 1945' show a total production of crude oil amounting to 2,700,000 metric tons. The run to stills was 2,773,782 tons and products obtained were 2,619,670 tons. Internal consumption was 800,000 tons and exports 1,970,000. Destination of exports is given only for the period January-April and show 911,108 tons going to the U.S.S.R., 147,752 tons to the front, 341 tons to Bulgaria and 2,653 tons of bunker oil. In the seven months' period drilling in old fields totalled 86,700 meters (283,509 ft.), and wildcats 9,000 meters (29,430 ft.). Stocks on hand July 31, 1945 amounted to 144,312 tons of crude and 182,005 tons of products, total 346,317 tons.

Drilling and production activities of the principal companies during the first six months are given in the accompanying table.

Company	Production of Crude Oil Tons	Meters Drilled
Astra Romana	775,420	15,486
Concordia	269,144	11,836
Romano-Americana	240,232	9,598
Steaua Romana	216,563	5,880
Unirea	195,728	11,522
Colombia	170,583	3,030
Creditul Minier	127,755	6,119
Prahova	97,280	3,648
I. R. D. P.	44,207	999
Expl. Perim. Stat.	26,615	493
Foraj Lemoine	10,488	815
Dacia Romano Ltd.	8,735	1,601
Redeventa	15,082	2,159
Starnaphta	2,718	---
Naphta Romana	9,118	---
Sarpetrol	5,024	---
Other enterprises	89,286	1,542
Total	2,303,978	74,728

ILLUSTRATION SHOWS TANKS DURING ERECTION AT OIL SERVICE STATION



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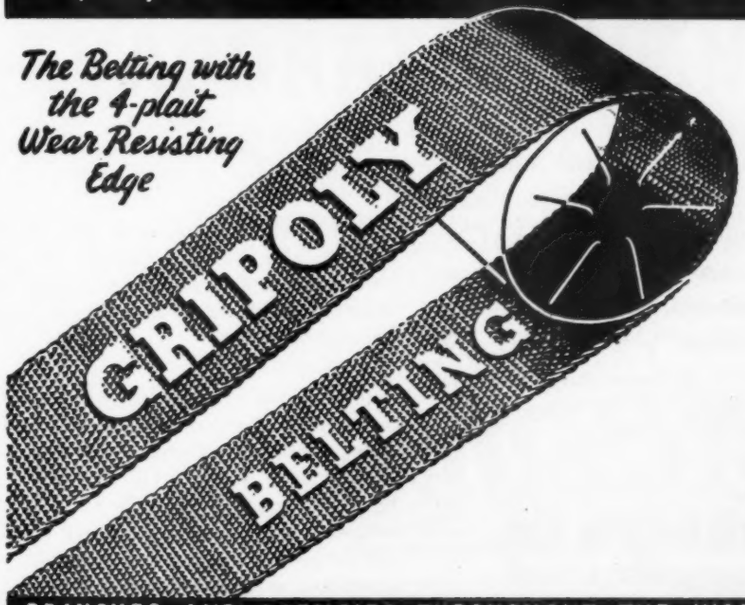

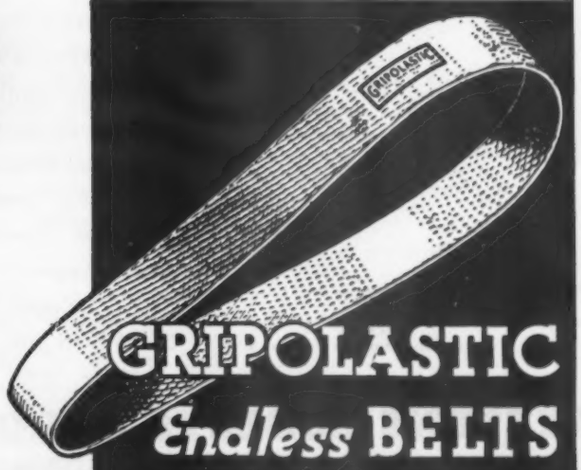

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International Petroleum Exposition in 1947

THE International Petroleum Exposition will be held in Tulsa, May 17 and 24, 1947, according to an announcement by W. G. Skelly, President. It will be the first show since 1940, the intervening expositions having been cancelled because of the war.

Dates were selected by the executive committee following a poll of previous exhibitors who voted overwhelmingly to resume the International Petroleum Exposition in the Spring of 1947. The first exposition was held in 1923 and in intervening years has grown to be one of the largest single-industry expositions in the world. It has attracted huge exhibits and delegations from more than a score of foreign countries.

The 1947 exposition will have even more foreign countries represented than in past years, it was indicated by President Skelly. Many inquiries already have been received from previous unrepresented nations.

"Our greatest problem in the 1947 exposition will be finding space to take care of the exhibitors", Manager Wm. B. Way told the executive committee. "In our last show all of the space was sold, and we turned away many possible exhibitors. With the growing interest in new development, and the large quantity of new equipment the accommodation of exhibitors will be a major problem. Our exposition plant, which includes 50 permanent buildings, and nearly a half million feet of floor space, will be adequate".

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To Drill in North Carolina

IMMEDIATE plans to drill for oil on the barrier beach off the coast of North Carolina have been announced by the Standard Oil Company of New Jersey. A wildcat well will be sunk near the old Cape Hatteras lighthouse which is 160 air miles southwest of Norfolk, Virginia and some 60 miles south of the famed Kitty Hawk, North Carolina air field of the Wright brothers' first flight. Standard Oil geologists have spent more than two years studying the Atlantic coastal plain region and have supplemented geologic mapping with geophysical surveys including both gravimetric and seismographic methods.

Interpretation of the results of this work has led to the selection of Cape Hatteras for a first test, because it seems to offer the greatest assurance of a thick section of Upper Cretaceous beds probably deposited under marine conditions and rising shoreward in a series of overlapping wedge-shaped beds which would form suitable traps to retain any oil and gas which may be present. Geophysical data indicate that the ancient crystalline basement, upon which the coastal plain formations of Cretaceous and Tertiary ages were deposited, may lie as deep as 8500 feet in the Hatteras area. This is the ultimate objective of the test well.

The Standard Oil Company of New Jersey has leased from the State of North Carolina approximately 1,400,000 acres of shore and shallow water areas, as well as many leases of private land.

Actual drilling of the Hatteras test has been contracted to the Noble Drilling Company of Tulsa, Oklahoma. Technical direction of the test will be by Standard Oil Company of New Jersey men and the well will be carefully logged, both electrically and by taking core samples, so that the company may obtain all possible geologic information as a guide to their further exploration program.

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New Mineral Oil Competitor

A new synthetic lubricant containing no mineral oil has been developed by Carbide and Carbon Chemicals Corporation and is being sold to the automotive trade in a number of key test areas under the name of Prestone at 75 cents per quart.

The new lubricant is said to be a derivative of some polyhydric alcohol, probably one of the polyethylene radicals manufactured from the same materials as ethylene glycol which Carbide pioneered as an antifreeze. Water soluble and non-soluble types are made.

Properties of the new lubricant are said to be impressive. It is wax free and has pour points ranging from -30 to 80°F. permitting easy cold-weather starting. Flash points are 300°F. or higher. Density is approximately that of water. Carbon residue values are said to be less than 0.01 regardless of viscosity. The lubricants have very high viscosity indices ranging from 140 to 160.

The lubricant is a saturated compound said to be highly resistant to oxidation and hence varnish and sludge formation is virtually eliminated in internal combustion engines. Road tests on military vehicles and private truck fleets have covered more than 1.5 million miles. A research group of 55 men is said to have been working on the project.

This new competitor of petroleum oils will be offered for refrigeration machinery, hydraulic fluids, textile lubes, wire drawing, grease bases and heat transfer liquids.

Boomer Heads Tube Turns

GEORGE O. BOOMER, longtime associate of the late Walter H. Girdler, Sr., founder of Tube Turns, Inc., Louisville, Ky., was elected president of the firm at a recent meeting of the board of directors. He was vice president of Tube Turns when Mr. Girdler died suddenly last January.

J. C. Failing Back From Service

J. C. FAILING has assumed the duties of sales engineer for the George E. Failing Supply Company of Enid, Okla., and Houston, Texas, manufacturers of portable exploration and drilling equipment. He has been associated with his father in the manufacture of drilling equipment since the company first was organized except during the war when he served with the Sea Bees in the Pacific.

Axelson Adv. Manager

L. F. "BILL" Lutz has been appointed advertising manager of Axelson Manufacturing Company to succeed J. L. Quisenberry who resigned to create his own advertising organization at Huntington Park, Calif.

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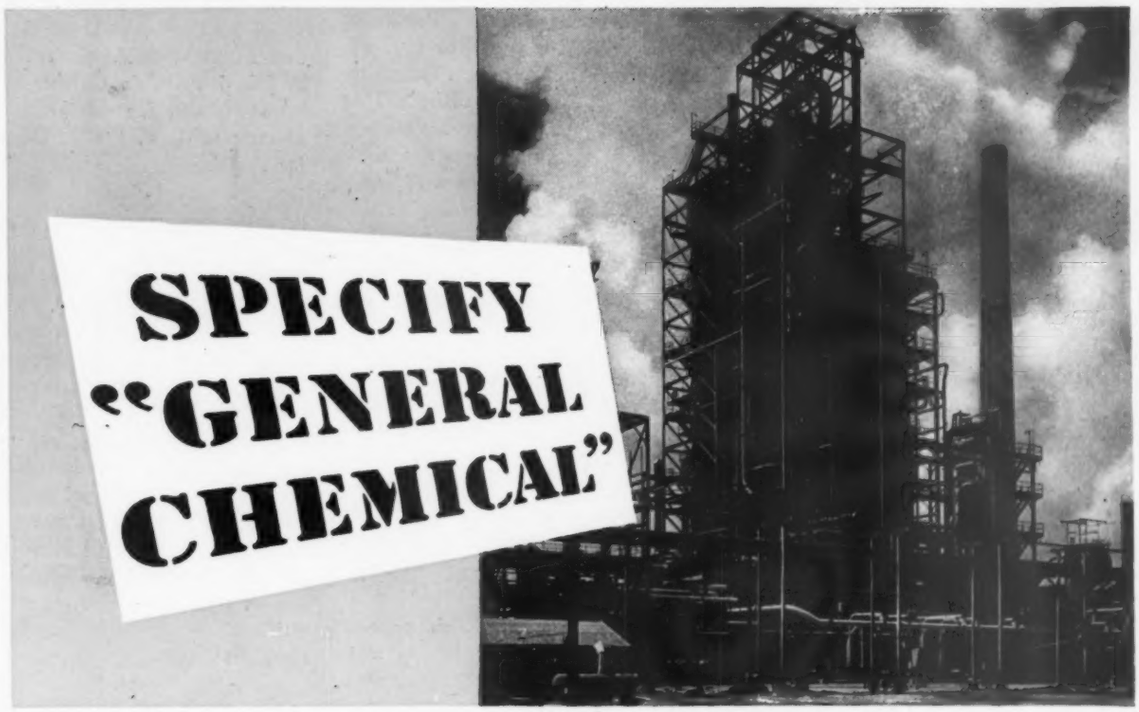

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OIL COMPANY STAFF CHANGES

(*Continued from page 62*)

Roy W. Merritt

ROY W. MERRITT, now special representative for South America of the producing department of Socony-Vacuum Oil Co., Inc. of New York, assumes this post with a notable background in connection with Latin American oil affairs.

Mr. Merritt initiated his career as a geologist with Shell back in 1912, being promoted subsequently to field superintendent and then manager at Maracaibo and later assistant general manager at Caracas of the Caribbean Petroleum Company. He was then transferred to the New York office of the Asiatic Petroleum Company, specializing in Latin America oil affairs and in 1937, in connection with Shell's exploratory program in Central America, he was appointed general manager of Shell operations with headquarters in Guatemala, later returning to the New York office until 1942.

Early in the war the United States State Department organized a special division dealing with foreign oil activities and created various Petroleum Attaché posts in South America. Mr. Merritt was appointed Petroleum Attaché of the United States Embassy at Bogota. His keen and analytical reports on Colombian oil developments, particularly in connection with the various proposed amendments to the oil statute, gained for him a special distribution in these matters.

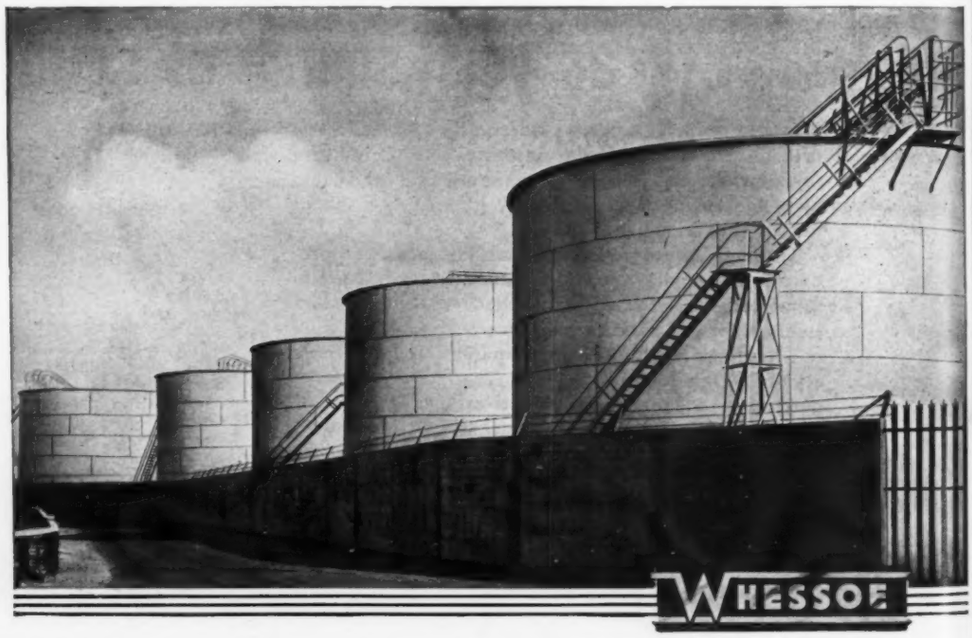
In 1944 Mr. Merritt accepted his present assignment, with headquarters at Bogota and Lima.

AFTER two years with the Petroleum Administration for War, E. O. Jones has rejoined Ethyl Corporation and will be a staff assistant to Julian J. Frey, General Sales Manager, it is announced. Mr. Jones, who had been with Ethyl for 12 years, was serving as Acting Assistant Manager of the Safety Department when he joined PAW in October 1943, as a petroleum engineer. He was later appointed special assistant to A. P. Frame, Director of Refining for PAW.

COMMANDER TED MILES has returned to Union Oil Company of California from service in the Navy and been named manager of foreign operations for the company. He will have under his direction the company's producing and drilling in Paraguay and other foreign countries where development may be undertaken.

Commander Miles spent five years in Colombia, Venezuela and Guatemala before joining Union in 1925 as assistant field geologist in the San Joaquin Valley. After a number of promotions he was made production superintendent in 1933 and manager of field operations in 1938. He was on a special exploratory assignment in central and south America just before he entered the Navy in 1942.

(*Continued on page 92*)



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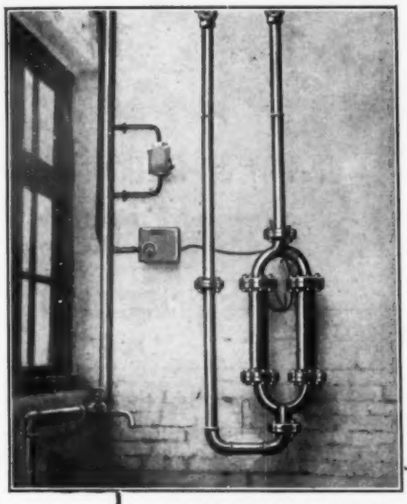

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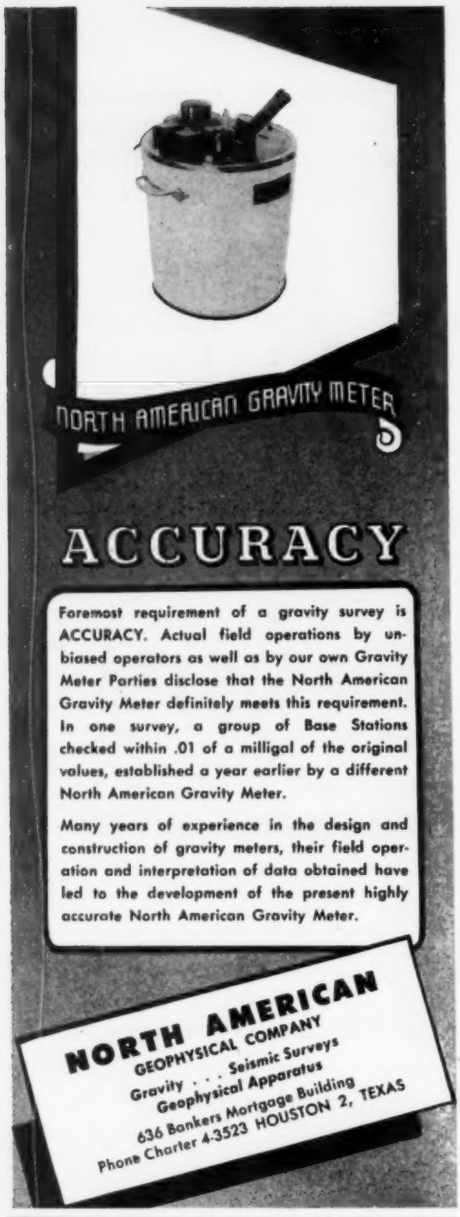
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CARLETON D. SPEED, JR., of Houston, has been made chief geologist and superintendent of exploration for Plymouth Oil Company, Sinton, Texas. Mr. Speed is a past president of the Houston Geological Society and has been active in the American Association of Petroleum Geologists.

During the war Mr. Speed served two years at Washington with the PAW. He returned to Houston in September 1944 when he resigned as chief of Exploration of the production division of PAW. The new connection will not affect Mr. Speed's extensive producing and royalty interests. Recently he bought mineral rights under 59,000 acres in 66 Texas counties from the First Texas Joint Stock Land Bank.

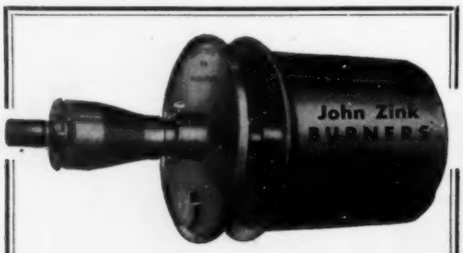
HAROLD R. DEAL, advertising and sales promotion manager for Tide Water Associated Oil Company, was unanimously elected president of the Western States Promotion Council at its recent annual meeting. This was the first post-war meeting of the organization, which is composed of groups engaged in promotion of tourist travel in the West. As new president, Deal succeeds Ted Huggins of Standard Oil, who resigned because of a company transfer.

George Ayrault now represents Standard Oil Company of California on the Council.

HARVEY W. BLANKENSHIP has been appointed advertising manager of Universal Oil Products Company, Chicago. He has been sales promotion manager of the industrial division of S. C. Johnson & Son, Racine, Wis. For a number of years prior to that connection he was advertising manager of Graver Tank & Mfg. Co., Inc.

In his new position Mr. Blankenship will direct all activities of the advertising and technical education department for Universal.

Harvey W. Blankenship



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VENEZUELA

(Continued from page 37)

munist but has been described as a "mild socialist". Those who know him well say that nothing drastic need be feared from him or his party. The provisional government appointments which he has made seem to bear this out. For example, it is understood that when he offered the Ministry of Foreign Relations to a non-Democratic Action party member, Dr. Carlos Morales, head of the Supreme Court who is noted in Venezuela for his integrity and wisdom, Dr. Morales refused to accept the post until he had sufficient opportunity to satisfy himself concerning the patriotism and soundness of the party and its policies. Among President Betancourt's other appointments have been young men of ability, progressive but not radical, and in some instances he has appointed men of more conservative viewpoint than those in the same offices under the former administration.

There is substantial ground for the hope that the spreading optimism concerning Venezuelan internal affairs is thoroughly justified. At the same time the appearance of violence upon the Venezuelan scene, coupled with the ferment and unrest in the Middle East over the Zionest problem and the current Dutch East Indies revolt, caused Secretary of Interior Ickes to comment that these occurences in the important oil areas of the world demonstrate the urgency of early ratification of the Anglo-American oil treaty and the calling of the proposed multilateral world oil conference. Oil is of such importance to the entire world that its development should be handled in an orderly fashion and whether or not it reaches the consumers of the world in adequate amounts at reasonable prices and contributes its necessary and important part in the achievement of world peace should be of international concern and handled on that basis.

First South American Oil Convention

DIRECTORS of the South American Petroleum Institute are going ahead with preliminary arrangements for the First South American Petroleum Convention which is to be held in Lima, Peru, in January, 1946, according to an announcement by Sr. Carlos R. Vegh Garzon of Montevideo, president of the Institute.

Principal object of this Convention is to study oil refining and production problems in South America. Consideration will be given to methods of increasing international oil trade among Latin American nations. Transportation facilities also will be studied.

Rules and agenda of the Convention will be considered in a meeting of the international permanent council of the Institute that will be held in Santiago de Chile next January.

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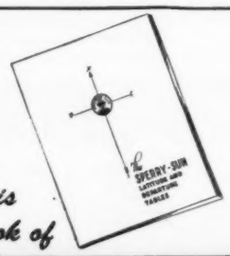

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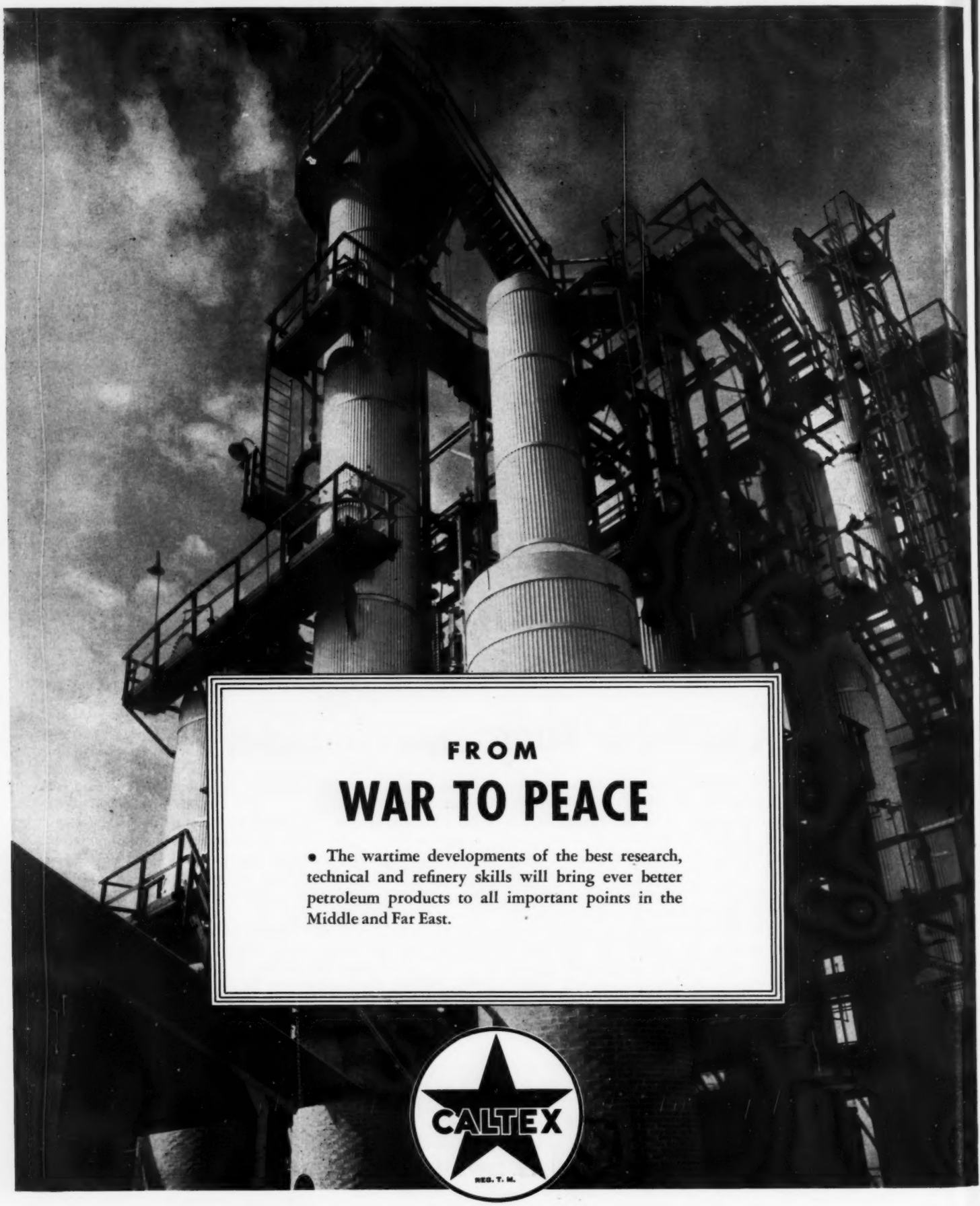
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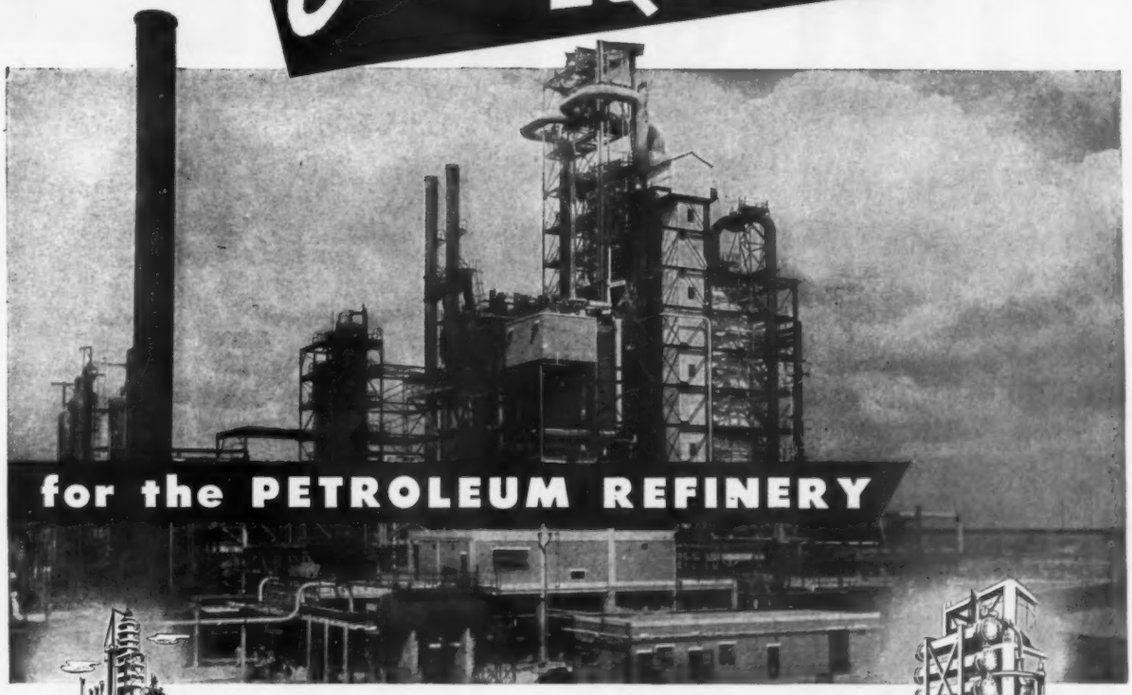

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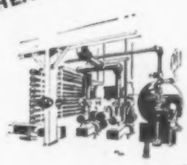

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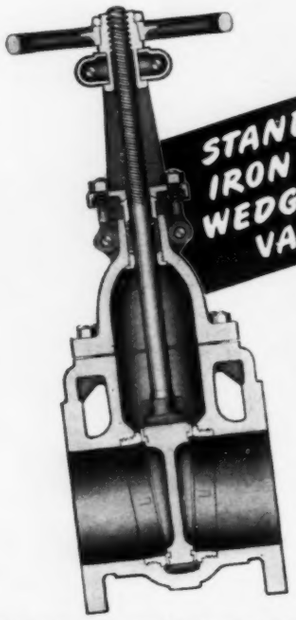

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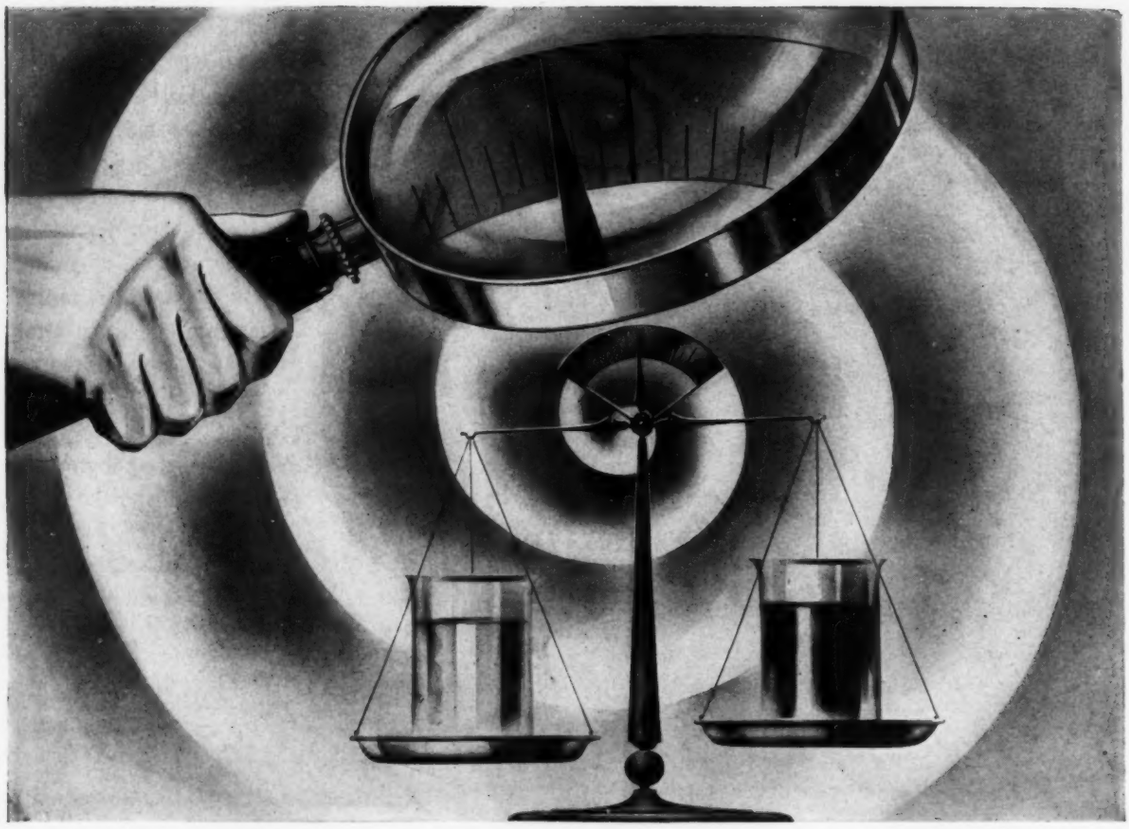

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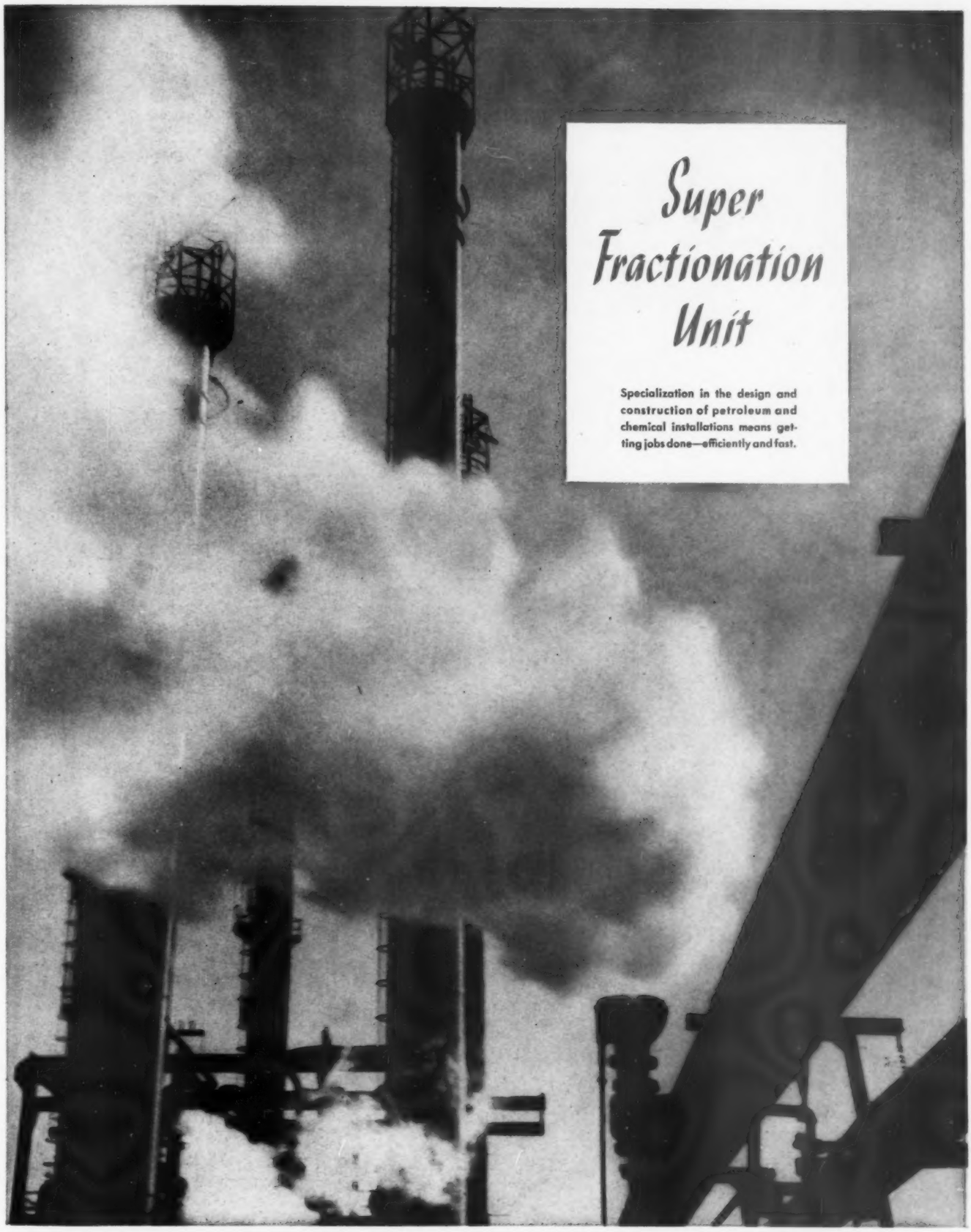
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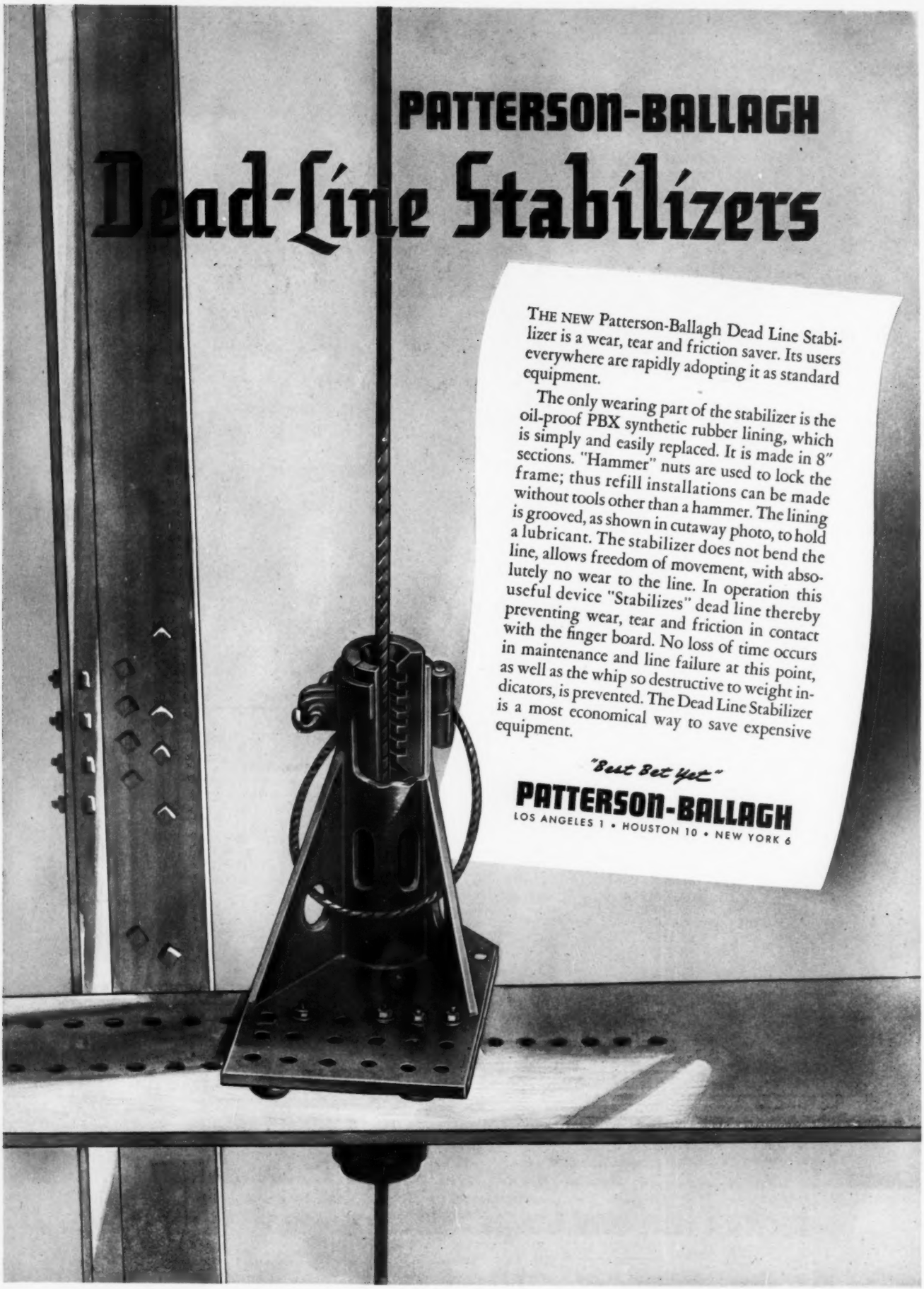
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ALCO PRODUCTS' postwar manufacturing and service set-up for the Oil Industry has been advanced with the acquisition of Beaumont Iron Works.

This merger brings to the oil industry the advantages of being able to buy drilling, producing and refining equipment from a single dependable source.

The high standards always associated with ALCO Heat Exchangers, Pressure Vessels and Prefabricated Piping, and with Beaumont Oil-Well-Drilling and Production Equipment, will be firmly maintained by the present Beaumont and Alco management and personnel.

Jones & Laughlin Supply Company will continue as exclusive stock distributor of the Beaumont line.

ALCO is now prepared to supply, design, or build to your specifications, oil-drilling, producing and refining equipment units and components including:

- Drawworks
- Crown Blocks
- Traveling Blocks
- Tubing Blocks
- Diesel Engines
- Pumping Blocks
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- Well-Head Assemblies
- Alloy Steel Castings
- Heat Exchangers
- Steam-Generating Equipment
- Coring Reels
- Prefabricated Piping
- Pressure Vessels
- Steel-Plate Work
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- Large-Diameter, Electric-Welded Steel Pipe

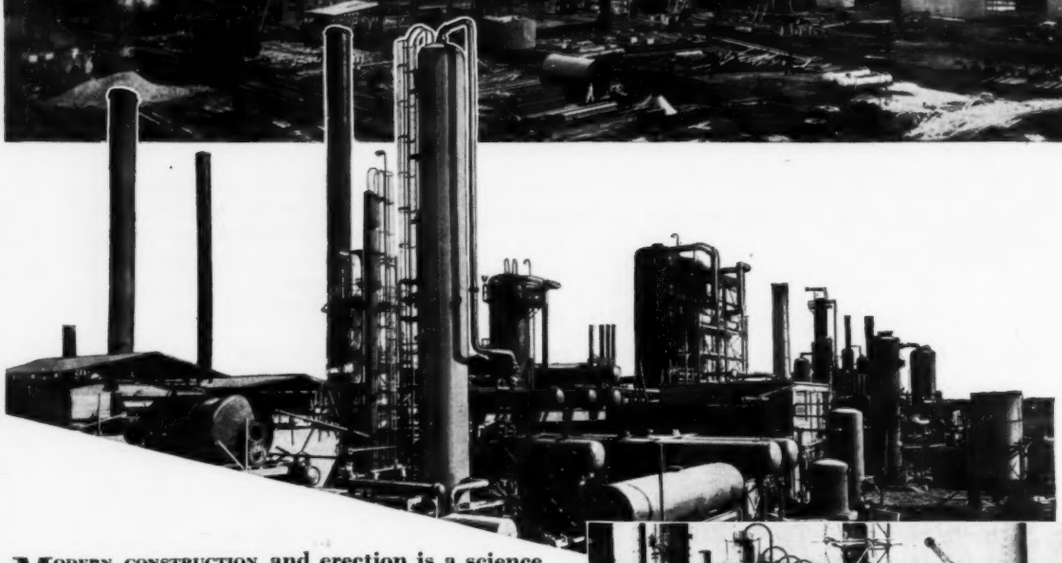
American Locomotive Company

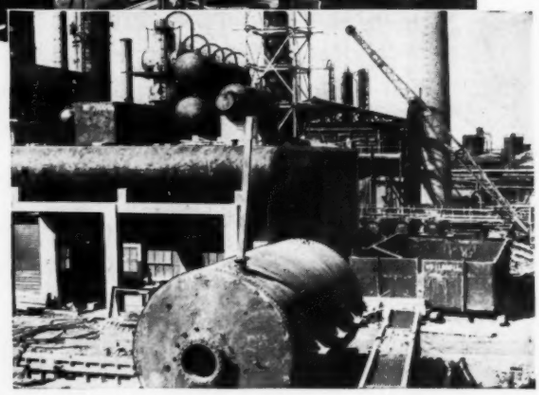
ALCO PRODUCTS DIVISION

Plants: Dunkirk, N. Y. • Beaumont, Texas. Main Office: 30 Church St., N. Y. 8, N. Y.

DNT BEAUMONT IRON WORKS COMPANY

IT TAKES MORE THAN STEEL!





MODERN CONSTRUCTION and erection is a science . . . a job that requires not only engineering skill, but experience as well. That Graver Construction Division has that skill and experience is evidenced by the many jobs which this capable organization has completed to the entire satisfaction of all concerned.

In addition to this complete service, Graver can supply whatever process equipment may be desired, fabricated by our manufacturing division to meet the most exacting requirements.

If you are contemplating any new construction, dismantling, or re-erection, consult Graver. We'll gladly submit comprehensive cost estimates.

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Construction Division
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GRAVER TANK & MFG. CO., INC.
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NUMBER SEVEN

At the United Strip and Bar Mills Templeboro plant are installed the pioneer rolling mills in this country, for the continuous large scale production of hot-rolled steel strip. From billets produced in the adjacent melting shops and rolling mills, the steel strip is produced at incredible speed. Much of the strip produced is destined for further processing by cold rolling, but large tonnages are used in all engineering trades for parts which can be rolled, pressed or otherwise formed, and in the manufacture of tubes.

THE UNITED STEEL COMPANIES LTD

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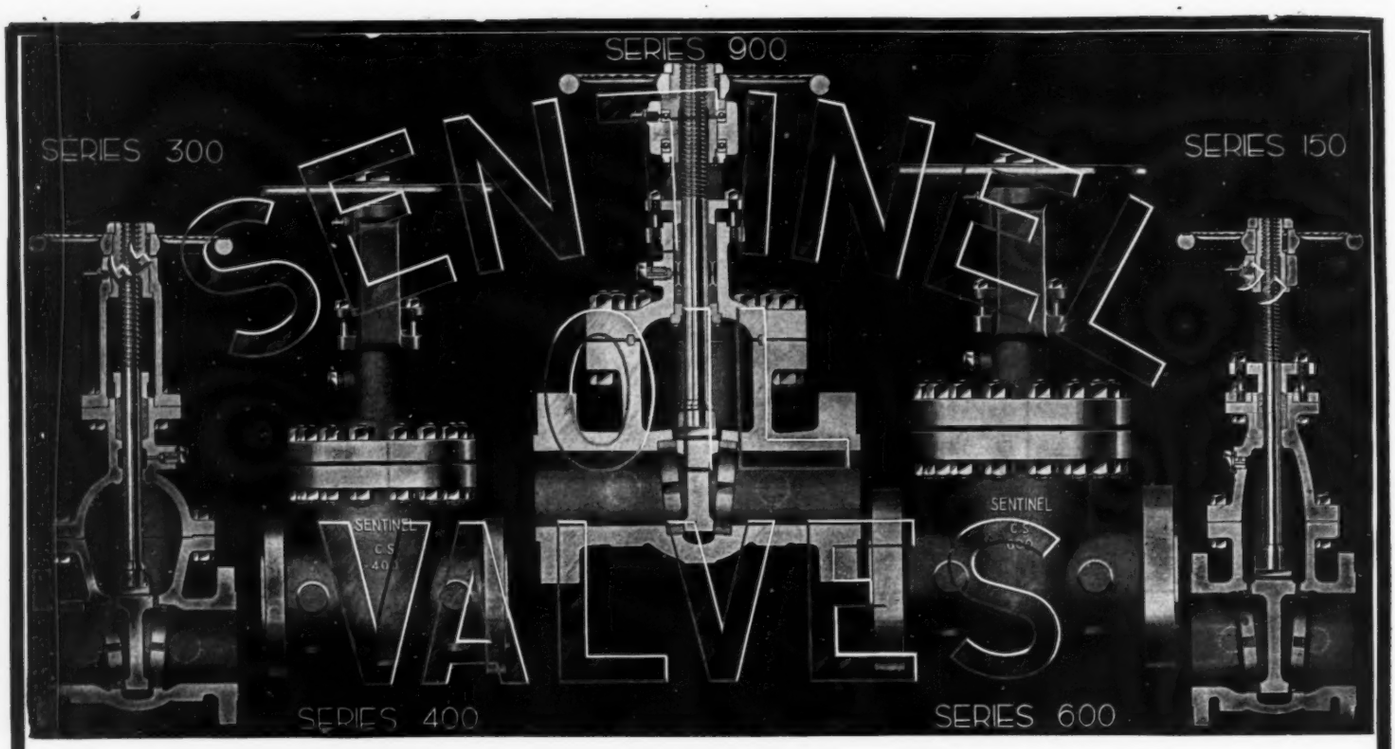

— ARE SECOND TO NONE —

They are the result of many years' experience in the design and manufacture of fittings for the Oil Industry. Constructed with first class materials, and workmanship, in conformity with the requirements of A.P.I., A.S.A., and S.O.D. specifications, combining the latest innovations applicable to such equipment, "SENTINEL" fittings are the safeguard and guarantee against inefficiency, ensuring maximum performance combined with highest quality.

"SENTINEL" VALVES FOR OIL IN SERIES 150 TO 1500, OFFER DEPENDABLE CONTROL EQUIPMENT IN WEDGE GATE; PARALLEL FACED; GLOBE STOP; AND SWING CHECK VALVES; ALSO DRILLING, AND FLOW LINE VALVES;

having appropriate trimmings for all pressure and temperature ratings.

FOR SURE CONTROL IN YOUR NEXT PROJECT PROGRAMME SPECIFY

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ALLEY & MACLELLAN LTD

SENTINEL VALVE WORKS, WORCESTER, ENGLAND.

Wherever there's Oil
WHEREVER there's oil, American ingenuity will find it...so long as the invigorating spirit of Free Enterprise is alive to stimulate and reward the individual for great risk and hard work.
Wherever there's oil, you will have Youngstown tubular goods... drill pipe, casing, tubing, line pipe... to help you find, produce, refine and distribute it.
Having served the oil industry with dependable pipe for 42 years, Youngstown is well prepared to give you the service you must have to supply the products of petroleum and natural gas upon which America's future welfare depends.
QUALITY
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THE YOUNGSTOWN SHEET AND TUBE COMPANY
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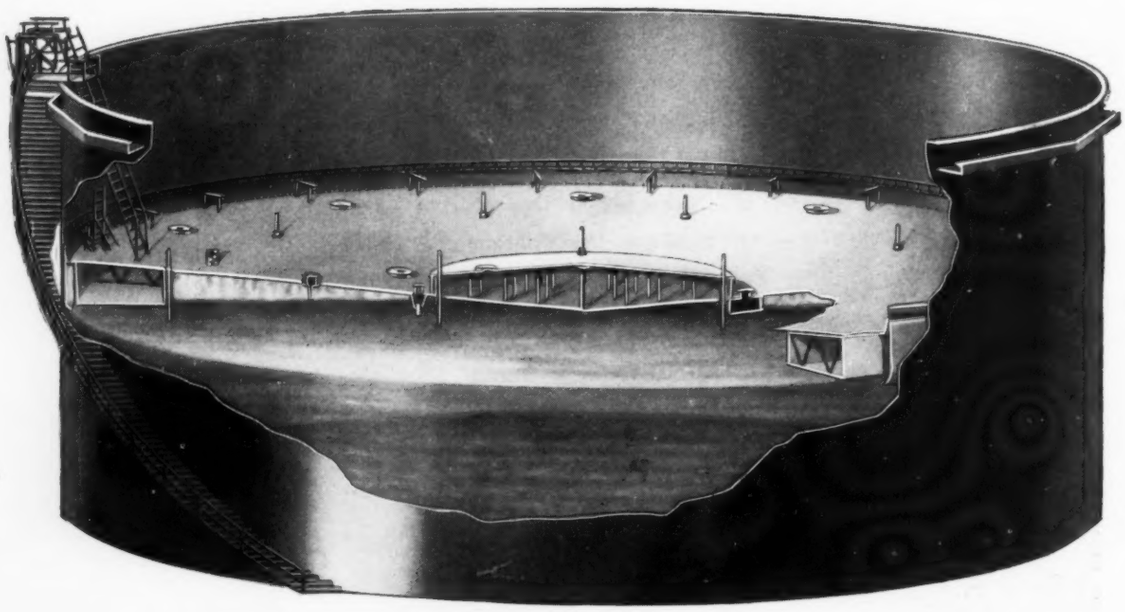
GENERAL AMERICAN NOW OFFERS IMPROVED VAPOR SAVING STRUCTURES

NEW AND IMPROVED WIGGINS PONTOON ROOFS

and other patented Wiggins structures are manufactured and sold under exclusive license by

GENERAL AMERICAN TRANSPORTATION CORP.



CUT-AWAY VIEW of an improved Wiggins Pontoon Roof installed on butt welded tank. Note how roof floats directly on liquid, blanketing surface at all levels, thus stops evaporation loss and reduces fire hazard by eliminating active vapor space in tank. Note covered center pontoon which prevents evaporation of the liquid due to the heat of the sun, and new improved ladder which provides safe, easy access to deck from top of tank. Upper end of ladder rides around an ingenious "ferris wheel" and lower end is pivoted on peripheral pontoon. Handrails are provided for safety.

WIGGINS VAPOR SEALS
GATX
GENERAL AMERICAN

Exclusively THE NEW AND PATENTED BY JOHN H. WIGGINS

Wherever volatile liquids are stored or processed, Wiggins structures assure important savings, greater safety!

For years General American Transportation Corporation has been out in front in rendering service to the petroleum industry. Now General American has fortified its leadership by acquiring the sole rights to manufacture and sell, as exclusive licensee under John H. Wiggins patents, the new and improved Wiggins vapor-saving structures.

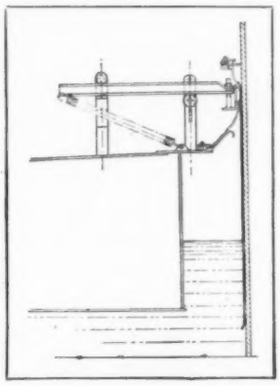
The new Wiggins Pontoon Roof, featuring many improvements, is typical of the many new and improved Wiggins structures manufactured by the General American Plate and Welding division. It can help you solve your evaporation-loss problems, safely and surely, because it floats directly on the surface of the liquid, stops evaporation loss, and reduces fire hazard.

COST AMORTIZED QUICKLY IN SAVINGS

Here are some of the losses which are prevented, eliminated, or reduced by the new and improved Wiggins Pontoon Roof, illustrated at left:

BREATHING LOSSES . . . Whenever increasing temperature causes expansion in vapor space of tanks having a fixed roof, vapor is vented to atmosphere. Losses resulting from this daily exhalation of vapor are called breathing losses—an expensive waste which is stopped by "improved" Wiggins Pontoon Roofs because of their elimination of *active* vapor space.

FILLING LOSSES . . . With fixed roof tanks, vapor is displaced through roof vents during filling. When a tank equipped with an "improved" Wiggins Pontoon Roof is filled, no vapor is displaced because roof floats on the liquid surface. No filling loss occurs from the small space between roof and tank shell because the volume of this space remains constant even when roof is rising.



Section of new and improved Wiggins Pontoon Roof seal showing details of shoes used with butt welded tank shells. A continuous strip of flexible seal material forms wind-proof connection between top of shoe and roof of deck.

BOILING LOSSES . . . In addition to eliminating all filling loss and reducing breathing loss to a minimum, the "improved" Wiggins Pontoon Roof traps vapor, formed by boiling, under the deck. This vapor is retained under roof until recondensed by cooler temperatures.

PROTECTION FROM FIRE

By eliminating the conditions which permit contents of tank to burn, the "improved" Wiggins Pontoon Roof effectively helps prevent fire. Liquid beneath deck cannot become ignited because there is insufficient oxygen present to support combustion. And since the tank has an open top, there is no danger of an explosive mixture forming above roof. The only point where a fire might conceivably burn is in space between rim of roof and tank shell. This space, however, is sealed with a fire-resistant material consisting largely of asbestos woven with glass, and repeated tests have proved that even if seal becomes damaged, a fire in this area can be easily extinguished, even after burning for some time. A complete discussion of the fire retardant features of the unimproved Wiggins Pontoon Roof may be obtained in the "Report on Floating Roof for Vertical Steel Storage Tanks" issued by the Underwriters' Laboratories, Chicago, Ill.

WIDE APPLICATION TO NEW OR EXISTING TANKS

The "improved" Wiggins Pontoon Roof is applicable to either riveted or welded tanks of all 15 ft. diameters or larger. It can be furnished with new tanks or installed in existing tanks, and for this reason finds wide application at pipeline stations, refineries, bulk stations, marine terminals and chemical plants. A sound investment for any large tank storing crude oil or gasoline, the "improved" Wiggins Pontoon Roof is also recommended for service on working tanks, blending tanks and tanks containing corrosive oils.

For complete information regarding the "improved" Wiggins Pontoon Roof or other "improved" Wiggins structures and their possible application to the solution of your special problems, get in touch with our nearest office.

General American Transportation Corporation

maintains offices in Chicago, New York, Washington, Cleveland, Buffalo, Pittsburgh, St. Louis, New Orleans, Tulsa, Dallas, Houston, Seattle and Los Angeles

Result of World's Greatest Catalytic Cracking Development—

NEW Mobilgas

GIVES FLYING HORSEPOWER

Now the same Super Power Ingredients

that helped make U. S. aviation gasolines the finest in the world, that gave U. S. fliers deadly new speed, climb and maneuverability —*Flying Horsepower in the air*—are now going into a great New Mobilgas that delivers Flying Horsepower in U. S. cars.

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12 Years of Research by Socony-Vacuum—

a $90,000,000 investment in new refining equipment and facilities — made Flying Horsepower possible. Socony-Vacuum has the greatest catalytic cracking production capacity in the industry—19 great catalytic cracking refining units.

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Peak Performance

Assured by Controlled Quality

Peak performance is assured in Ladish Forged Steel Flanges by the exacting metallurgical control which safeguards quality at every step in manufacture.

Each Ladish Flange bears the symbol of Controlled Quality . . . the Ladish Heat Code.

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TO MARK PROGRESS

The Drake Well . . . Christmas 1859

▲ To our many friends everywhere ▲ we extend our most sincere

▲ wishes for a Merry Christmas ▲ a joyous and prosperous New Year

▲ and happiness throughout all the years to come

CONTINENTAL

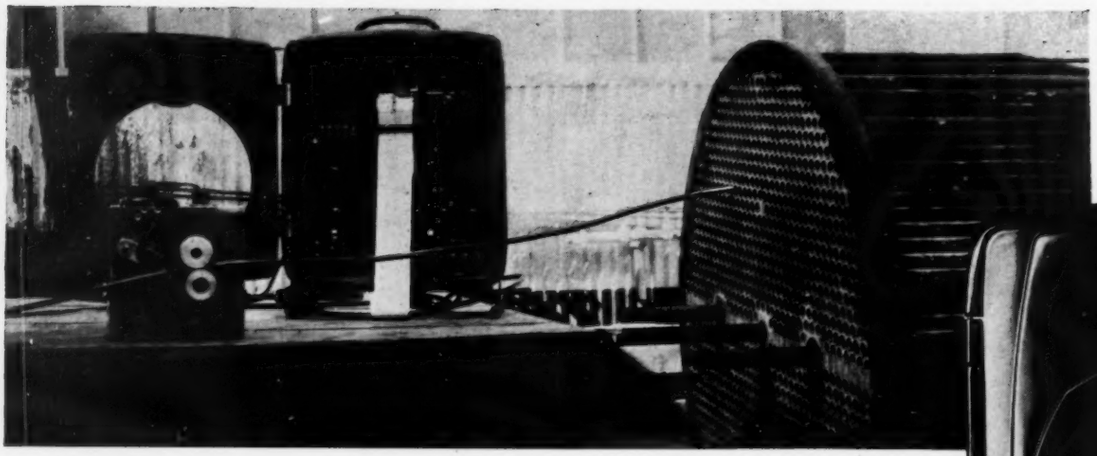
SERVING THE OIL AND GAS INDUSTRIES

"In marketing, the Jersey company functions primarily as a supplier of products for independent businessmen to sell. Its principal products are distributed through more than 20,000 individual businesses. Most of these are independent service stations; the rest are jobbers. These independent and, for the most part, small businessmen are so vital to the conduct of Jersey's operations that the company makes every effort to see that they stay in business and are successful."

From an address by R. T. Haslam, Director of Standard Oil Co. (N. J.)

STANDARD OIL COMPANY
(NEW JERSEY)
AND AFFILIATED COMPANIES

Aruba refinery; loading lines from the refinery to ocean-going tankers.



Probolog in use inspecting tube bundle. Picture shows probe in tube, probe puller withdrawing probe at constant rate, and recording instrument charting internal tube condition.

HERE'S A NEW WAY TO LOOK FOR TROUBLE!

THE PROBOLOG is an inspection device for testing non-magnetic tubes without removing them from the equipment in which they are installed.

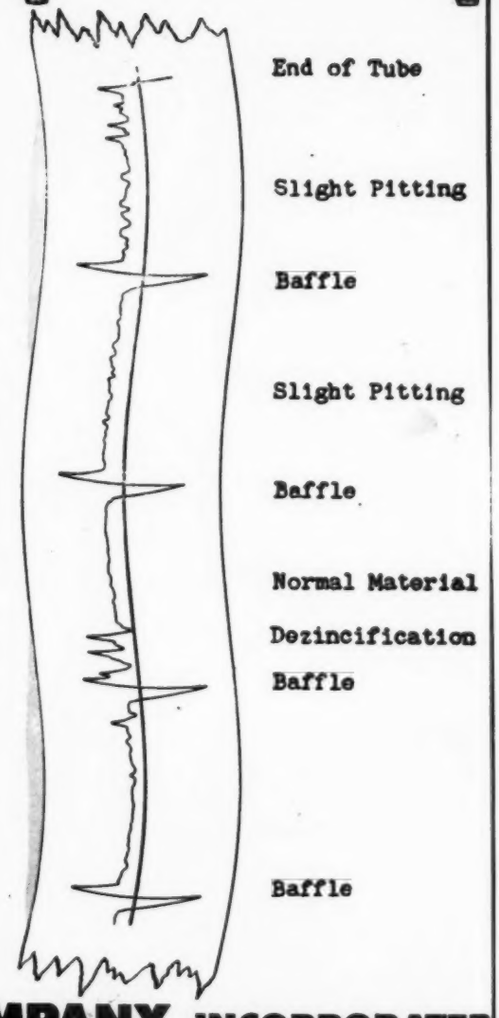
By using the device, it is possible not only to locate quickly and accurately, faulty, inaccessible tubes in heat exchangers, condensers and similar tubular equipment, but to obtain a graphic record of the defects as well.

How the Probolog works: A probe is pushed or pulled through a tube by a cable. As it moves through the tube, the recorder charts or flashes the position of each defect in the tube.

The Probolog detects dezincification, eroded and corroded pits, cracks, strained areas, increases or decreases in wall thickness, changes in alloy or chemical composition and abnormal changes in physical dimensions—a complete record in black and white.

The Probolog saves time and material. Dismantling and reassembling equipment is eliminated. Only defective tubes need be removed, and these may be reclaimed and salvaged.

Write for further particulars.



Actual graph of defective isobutane condenser tube.

SHELL

SHELL DEVELOPMENT COMPANY, INCORPORATED

50 West 50th Street, New York 20, N. Y.

TRADITIONAL RELIABILITY

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T-H

ELECTRIC MOTORS

BTH MOTORS AND CONTROL GEAR
used in all industries
throughout the world.

SPECIFY BTH

BTH RUGBY

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, RUGBY, ENGLAND.

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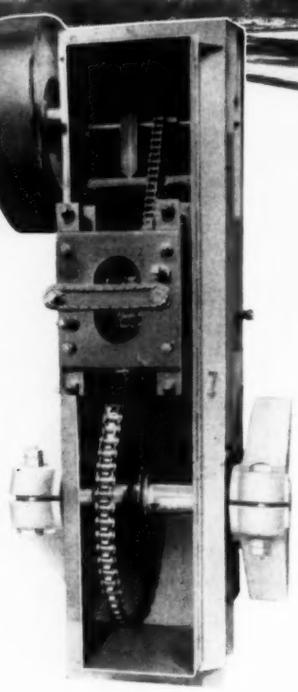


(Patented)

LEE C. MOORE—*CHAIN DRIVEN UNIT*

Designed with a minimum of power transmitting parts, there is less chance of unit break-downs. When adjustment is required, a simple chain tightening device permits accurate adjustments of the chains to be made in the field, without special tools. And if repairs are necessary to power transmission parts it's easy to replace a link in the chain, without taking the unit out of service.

Lee C. Moore Pumping Units permit a wide range of pumping speeds with the various types of prime movers. These units can be supplied from stock in most fields.

LEE C. MOORE & COMPANY
INCORPORATED
PITTSBURGH ● TULSA
EXPORT: OILFIELD-INDUSTRIAL EXPORT, INC.
30 Rockefeller Plaza, New York 20, N. Y.

Meet A New Product of Petroleum

PERHAPS the most important product of petroleum that will come out of this war is — jobs.

Jobs that didn't EXIST before. Jobs that will flood from the many new uses of petroleum.

Most—if not all—of the country's rubber supply will be made from petroleum.

The staggering post-war demand for plastic bases will be placed largely at the door of the petroleum industry.

Chemicals, drugs, and countless other materials that have lain unsuspected for years in petroleum, will add vast new scope to our activities. These and many more.

Petroleum's gigantic new family of products — born in the laboratories of America's great oil companies—will create pay checks, a greater national wealth, a sounder economic scheme.

Tide Water Associated, along with its brother oil companies, is proud of helping this expansion. Proud to be able to furnish new opportunities for our returning youth. Proud to contribute to America's future.

TIDE WATER ASSOCIATED OIL COMPANY
New York Tulsa San Francisco

TIDE WATER ASSOCIATED OIL COMPANY

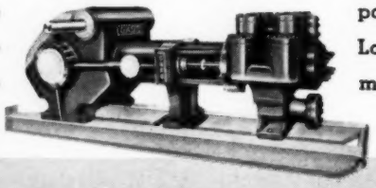
BUY VICTORY BONDS AND HOLD THEM

GASO SUCCESS IS BUILT ON THESE PRINCIPLES

THE MACHINE WITH FEWER PARTS GIVES LONGER SERVICE COSTS LESS TO MAINTAIN AND ACCOMPLISHES EQUAL IF NOT BETTER RESULTS

Simplicity of design is more than a policy at Gaso. It is a religion, practiced ever since the company was founded, more than 30 years ago. . . . Every type and model of pump in the Gaso line has been subjected to the same rigid test by Gaso engineers: Can parts be consolidated, or eliminated, without affecting the operation of the pump?

The results have been most gratifying. Not only has Gaso engineering reduced the number of parts but, in most cases, the parts eliminated have been those which gave most trouble in the past. It is this fact that explains the amazing performance records of Gaso Pumps, their long life, carefree operation and low maintenance cost.



Chosen to power the all-important military pipe lines, Gaso Pumps can be depended upon to give you the complete dependability you look for in your pumping equipment. . . Gaso Pump & Burner Mfg. Co., 902 East First St., Tulsa, Okla. Export Office: 149 Broadway, New York. Shreveport: W. L. Somner Co., 419 Lake St. Los Angeles: Production Equipment Co., 651-653 E. Gage Ave.

GASO PUMPS

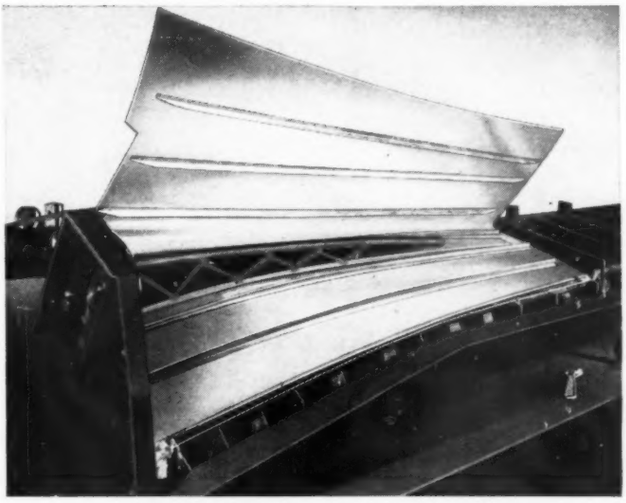
for every oil industry need

FAN FEATURES

that contribute to the economy and efficiency of

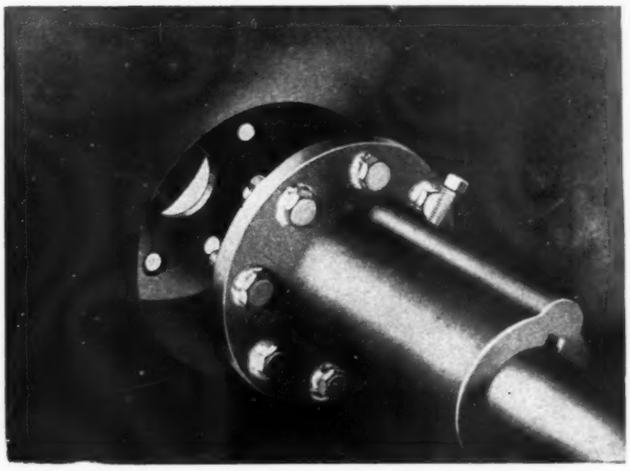
Pritchard COOLING TOWERS

DYNAMIC BALANCING is standard procedure in the production of Pritchard Featherweight Fans. Test apparatus includes this rig using an electronic balance indicator.



JIG FORMED for strict uniformity, blades are shaped from a single heavy wrought monel sheet with the trailing edge electric-welded. Note the welded-in "wing spar" and stiffening webs for staunch rigidity and endurance.

HUB SLEEVE on fan shaft provides key and set screw locking, yet permits removal of the fan assembly without driving the sleeve off the fan shaft.



Here are a few of the reasons why Pritchard FEATHERWEIGHT Fans are acclaimed by operators as the optimum answer to cooling tower fan problems:

1. LIGHT WEIGHT for low starting torque, minimum vibrational reaction and low loading on fan shaft bearings.
2. MONEL METAL BLADES for corrosion resistance and maximum delivery of air in ratio to horsepower.
3. ANTI-BACK-DRAFT HUB for streamlined flow of air; no turbulence or air return.
4. TRUE AIR-FOIL SECTION of blade equalizes air propulsion over full length of each blade. Practically noiseless in operation, with high efficiency at low tip speeds.
5. ADJUSTABLE BLADE PITCH permits selection of most desirable setting for any tower loading.
6. HUB SLEEVE (see lower left) permits easy removal of fan for winter operation and also makes quick work of removing the gear unit for servicing.

Continuous trouble-free performance over more than five years demonstrates the advantages of Pritchard's patented design and features, the result of comprehensive research to minimize power requirements, reduce maintenance and extend the life of mechanical draft equipment. These proven units are easily installed as replacements for obsolete, inefficient fan assemblies. They will pay for themselves quickly in savings of power, maintenance and down-time.

EQUIPMENT DIVISION

J.F. Pritchard & Co.

ENGINEERS AND CONSTRUCTORS

FOR THE CHEMICAL • PETROLEUM • GAS AND POWER INDUSTRIES

Manufacturers of Mechanical and Atmospheric Cooling Towers

FIDELITY BUILDING, KANSAS CITY 6, MO.

NEW YORK - PITTSBURGH - HOUSTON - ATLANTA - TULSA
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AS SOLID AS THE NATIVE ROCK

THAT'S THE *Guiberson* SPIRAL FORMATION PACKER

Guiberson steel spirals are packed with Oakum that will last indefinitely. Oakum is not affected by oil, water or well treating acids.

Here's the packer that's proving itself day after day in the field. The steel spirals bite into the walls of the hole and become mechanically meshed in the formation. Guiberson packers insure complete pack-off, cannot creep or be blown upward; yet, are easy and quick to pull. Can be used for all types of packing off. Write for free catalog with full details.

Principle of ordinary Friction Type Packer or plug.

Principle of Guiberson Spiral Type Packer or plug.

Operates on principle of screw. Lateral diameter of spirals actually increase when plug is set and spiral is compressed.

Guiberson U.S.A.

SAFE THAN SORRY BETTER BE GUIBERSON

THE GUIBERSON CORPORATION

Dallas, Texas

ESTABLISHED 1919

CALL YOUR GUIBERSON MAN:

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EXPORT REPRESENTATIVE
I. FRANK BROWN, 30 Rockefeller Plaza, New York, New York... Telephone . . . Columbus 5-6250

PRODUCERS OF OIL FIELD TOOLS, STEEL CABINETS, DOMESTIC OIL HEATERS, SHEET METAL PRODUCTS AND LIGHT WEIGHT AIR-COOLED DIESEL ENGINES

. . . you know the company is going to need an airplane — why it will be as much a part of the business as the new warehouse. This airplane is really built. I know it is good because the company making it helped build the ships we flew in combat. Performance is a matter of record.

. . . and another thing, since I am going to do the flying, I want those twin engines and variable pitch props. And boss, look — it is equipped with two-way radio and all the instruments for blind flying — it'll be a sweetheart on the gauges, and stay right in there with airline speed and cruising radius. It'll be a cinch for you, the plant manager and your chief engineer to make those meetings, like you always wanted to — and even pick up the branch managers at Greenville and Springfield. You all arrive together and leave when you want to. It's a natural.

Okay, son, I knew it was coming. It's the way we do business, but I wanted to wait and talk it over with you. Better write SOUTHERN for details. . . it *does* look like a good thing.

Southern
AIRCRAFT CORPORATION
PLANT IN GARLAND, DALLAS COUNTY, TEXAS

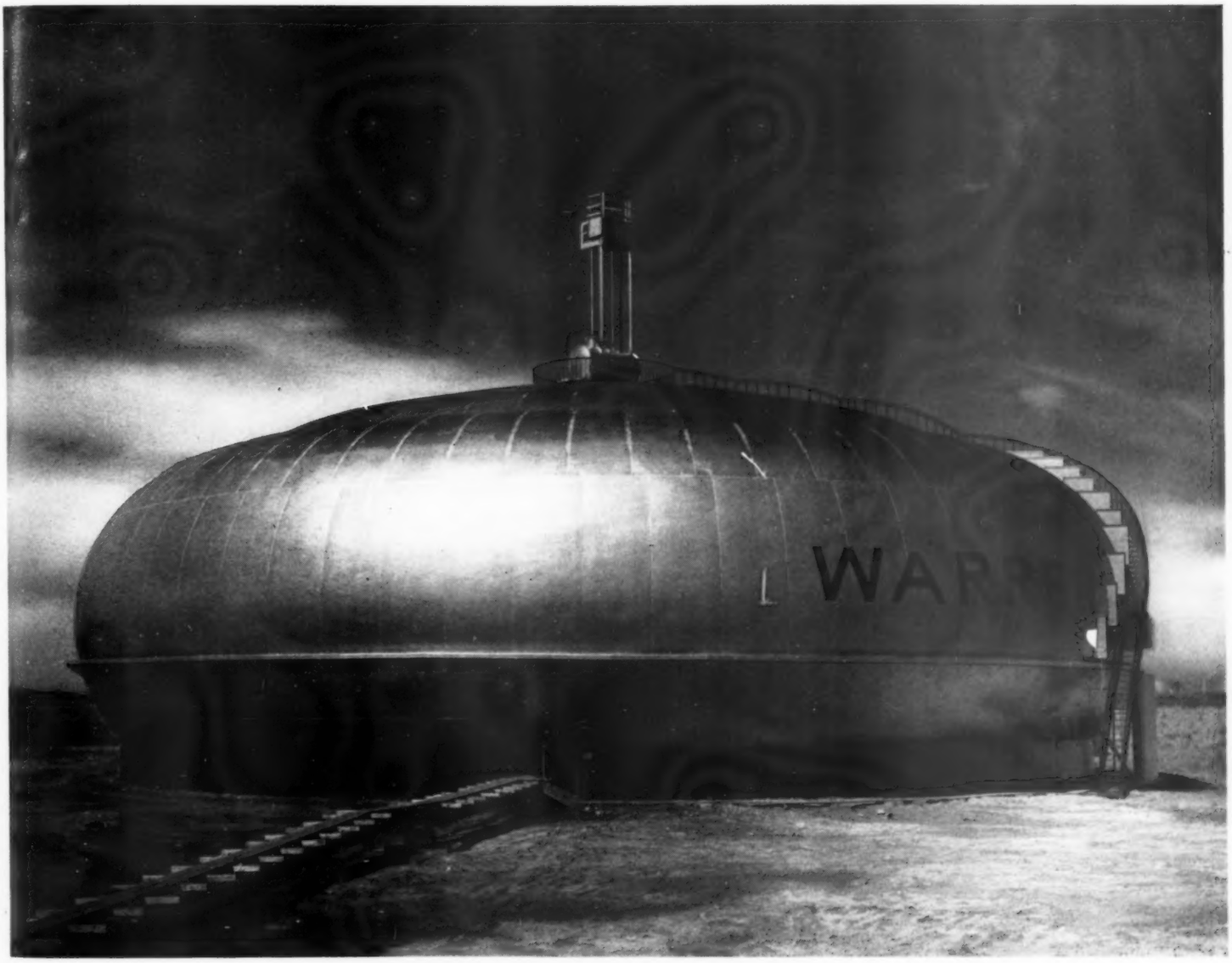
For Oil-Fired Furnaces

NETTLE (42/44% Al_2O_3) Firebrick is Highly Refractory (Seger Cone 34/35) and combines Resistance to Spalling and Corrosion with volume —Stability and Accuracy of Shape. Jointed with "NETTLE" Refractory Cement, it is recommended with confidence for Oil-Fired Furnace Linings. In cases where exceptionally high temperatures are experienced, we recommend "STEIN SILLIMANITE" (62/63% Al_2O_3) and where conditions are easier, "THISTLE" (35/37% Al_2O_3) Firebrick.

STEIN *Refractories*

JOHN G. STEIN & CO. LTD. BONNYBRIDGE, SCOTLAND

To Adequately Serve WORLD MARKETS In 1946

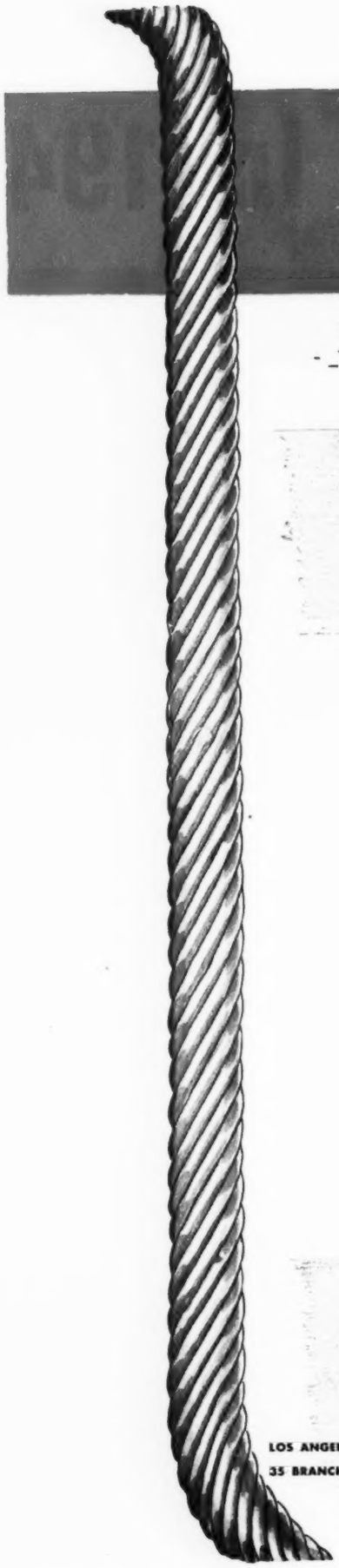


WARREN will appreciate hearing from world refiners regarding their bulk requirements of Natural Gasoline, Butane and Propane for the year 1946. Warren can supply your future needs and will gladly furnish information helpful to refiners. Warren maintains adequate High Pressure Storage Facilities at Port Arthur, Houston and Corpus Christi, Texas, and Marcus Hook, Pennsylvania.

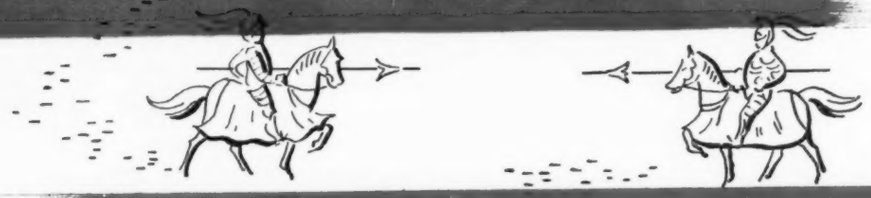
NATURAL GASOLINE
Chemical Grade*
HYDROCARBONS
Iso-Pentane
Normal Butane
Iso-Butane
Propane

WARREN PETROLEUM CORPORATION

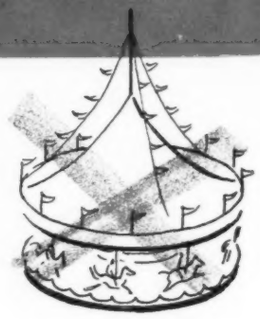
TULSA, OKLAHOMA, U.S.A.



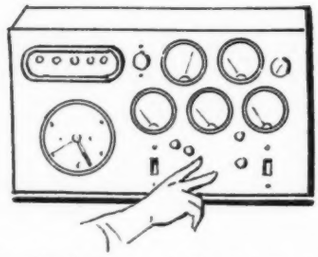
LANE-WELLS REVERSE CONCENTRIC ARMORED CABLES



ASSURE ACCURATE CHECKS OF YOUR DEPTH MEASUREMENTS



The construction of Lane-Wells Reverse Concentric Armor Cables—double layers of armor wire wound in opposite directions—does away with the "merry-go-round" action of tools and instruments being lowered into an oil well.



Torque action of conventional single lay cables is eliminated and cable stretch characteristics can be accurately calculated. Drill pipe measurements can be checked "on the nose". In addition this cable spools better and faster which means less time running in and out.

Standardization of the Reverse Concentric Cable is another Lane-Wells feature enabling Oil Operators to maintain better completion control as oil wells go deeper.

Call Lane-Wells and have the job done right.

Tomorrow's Tools—Today!

LANE-WELLS COMPANY

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Break THE *GRIP* *of heaving shale....*

LIKE the hand of a giant, heaving shale "freezes" the drilling string, bringing operations to a standstill. At the best it delays operations, greatly increasing costs. At the worst it forces the abandonment of potentially profitable drilling operations.

Yet heaving shale *can* be controlled, as many leading oil companies have proved. By checking hydration and keeping the shale strata stable, Texaco's Sodium Silicate method of heaving shale control has permitted the successful completion of many wells in areas where heaving shale has been a costly and sometimes insuperable obstacle.

The Texaco Sodium Silicate method is now being used by many major oil companies in the Gulf Coast Area. It has proved an important aid in bringing in oil that America needs.

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TEXACO DEVELOPMENT CORPORATION

A Subsidiary of The Texas Company

THE ALCO FUEL

for high efficiency and economy

An Extended-Surface Heat Exchanger

Reconversion to peace is under way, and this new ALCO standardized product is a head start to conversion for industrial oil-burner installations.

The heavier-grade and less-expensive oils require preheating for proper atomization and efficient combustion.

Now offered for IMMEDIATE SHIPMENT FROM STOCK, this Alco Fuel Oil Heater offers these important features:

1. HIGH HEAT TRANSFER DUE TO:

Superior baffle design and arrangement.

2. SIMPLICITY OF DESIGN:

A single U tube expanded into removable cover plate.

4. STANDARD SIZES AND LENGTHS:

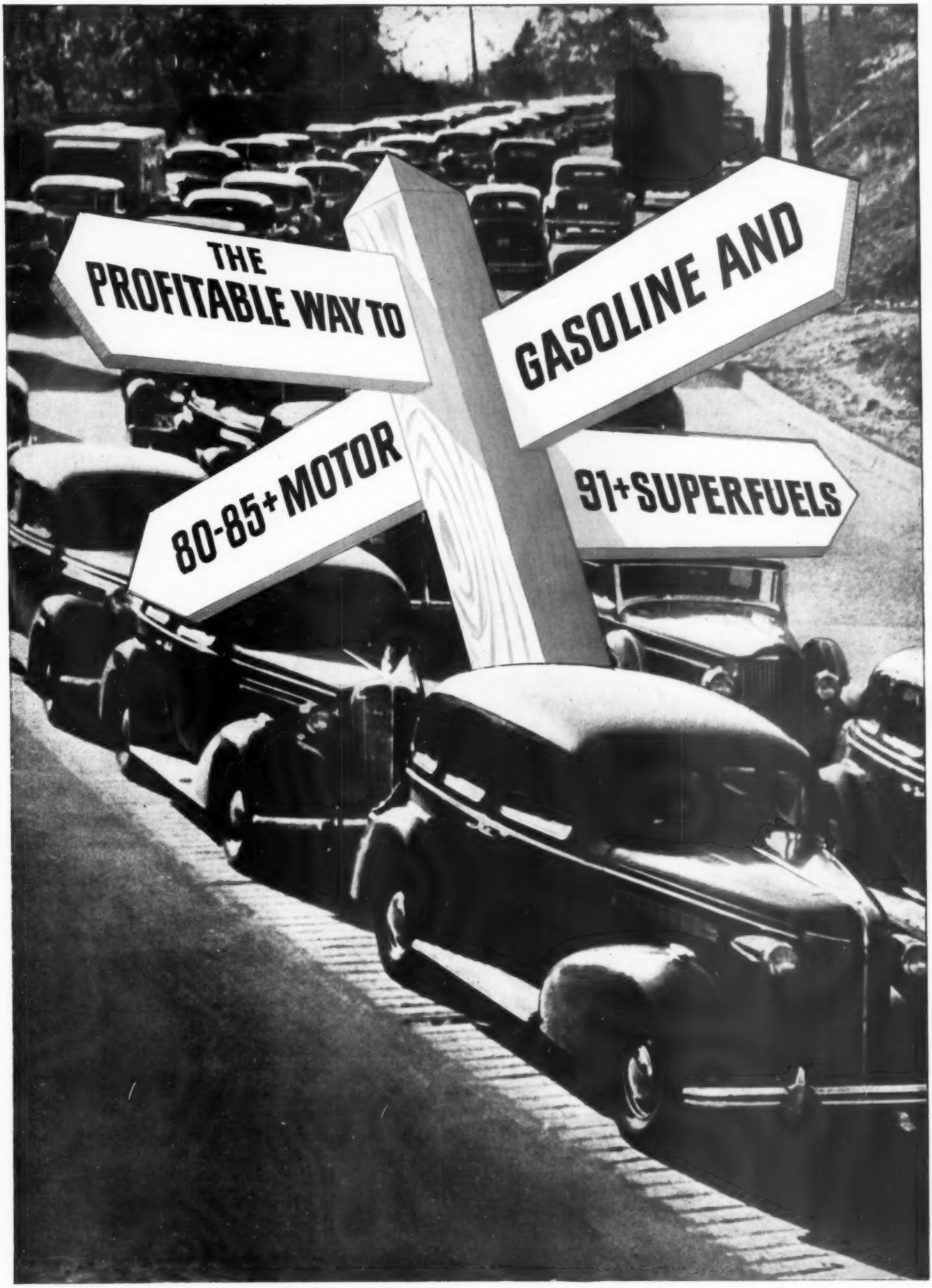
Six sizes of standard units provided. High-efficiency heat exchangers of any capacity can be built up from these standard ALCO "X-Fin" units.

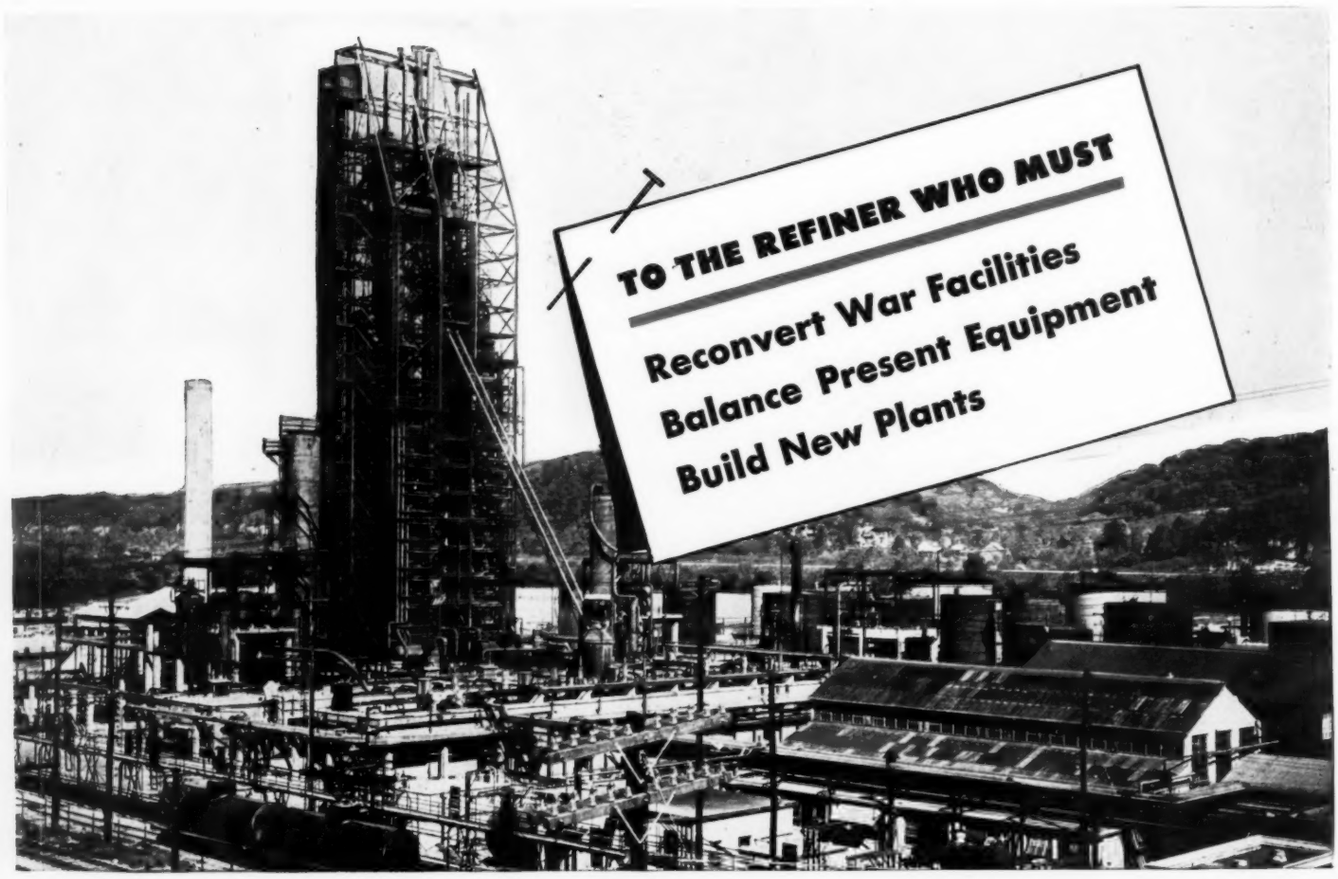
3. EASY TO CLEAN:

Baffle assembly easily separable from heat-transfer element.

HUNDREDS USED DURING THE WAR, in a wide range of applications besides fuel-oil heating. Here are a few of many suitable applications:

1. Pre-heaters for oil refineries, natural-gasoline plants, chemical plants. 2. Residuum exchangers. 3. Solvent plants. 4. Gas and air heaters. 5. Heaters for caustics, acids, alcohols and other chemicals. 6. Kerosene and gasoline heaters; propane vaporizers and superheaters. 7. Lube-oil coolers. 8. Quench-oil coolers. 9. Duo-Sol coolers. 10. Coolers for alkylation plants. 11. Gasoline and kerosene coolers. 12. Coolers for absorption processes. 13. Gas and air coolers. 14. Compressed-air aftercoolers.


THE
PROFITABLE WAY TO
80-85+ MOTOR
GASOLINE AND
91+SUPERFUELS



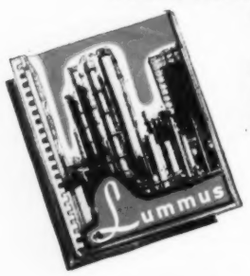
RICH in the experience of a major contribution to the petroleum industry's tremendous war-time program, Lummus offers its personnel and facilities for an impartial, thorough study of your problems.

Lummus is prepared to make for you — as they have made for many major refiners — complete studies leading to an unbiased selection of the best combination of processes to meet individual refining and marketing conditions.

In completely equipped, semi-commercial scale laboratories, these studies will be projected and construction and operating costs assembled for a sound presentation of the economics of the proposed modernization or new construction.

Plant design, the preparation of specifications, fabrication, erection and initial operation will be followed through by the organization that has built 85% of the TCC capacity and 80% of the Polyform capacity — and has established enviable records for speedy construction and long initial runs.

The same type of laboratory stock evaluations, complete engineering, design and economic service are offered to refiners contemplating the construction of refineries for the production of premium lubricating oils.



For further information on Lummus refinery surveys and construction, write for a copy of "Petroleum Refining Processes", containing latest data, flow diagrams, photographs.

For the time-saving profitable way to the economical production of 80-85+ or higher O.N. motor gasoline, put your problems up to Lummus.

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Lummus

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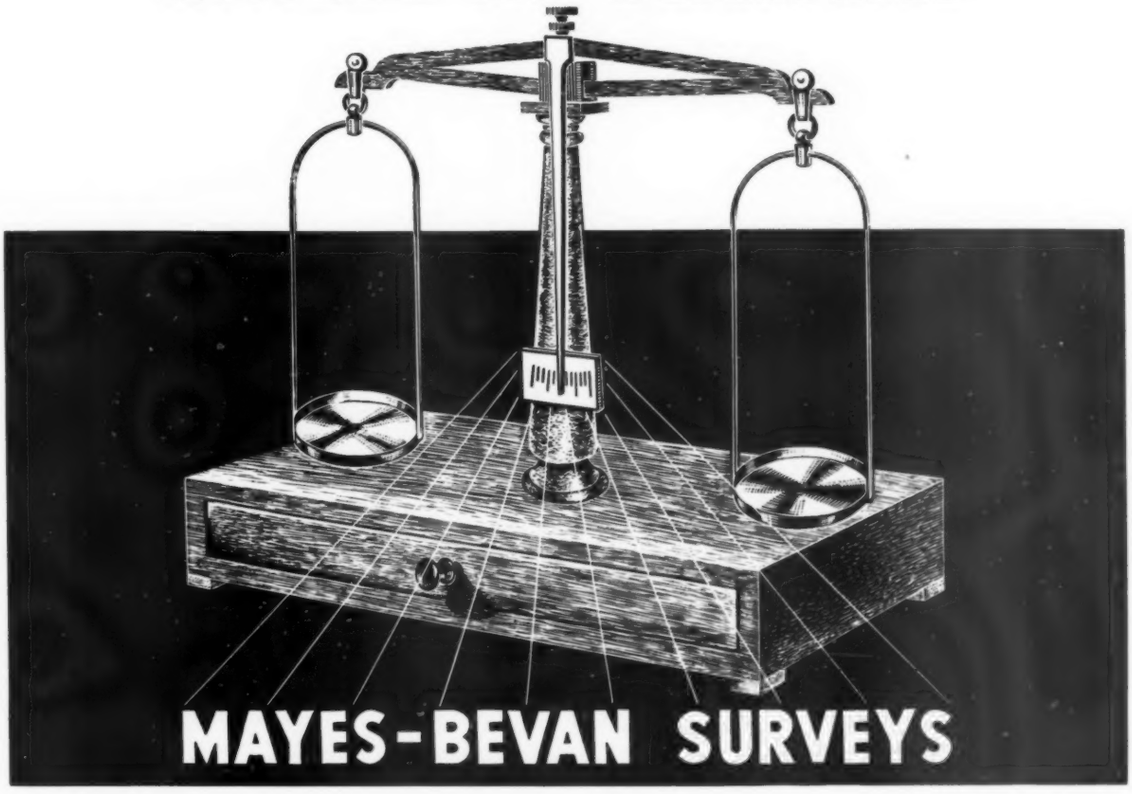
ACCURATE AND DEPENDABLE



A gravity-meter has more than 100 times the sensitivity of the best chemical balance. To make dependable surveys, with an instrument of such sensitivity, requires skill, experience and careful supervision. Mayes-Bevan surveys serve the oil industry with this thoroughness and dependability.

Mayes-Bevan Company M/B *Gravity Meter Surveys*

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AUDCO-NORDSTROM

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Lubricated VALVES

add safety to every branch of the oil and gas industry

INSTANT SHUT-OFF

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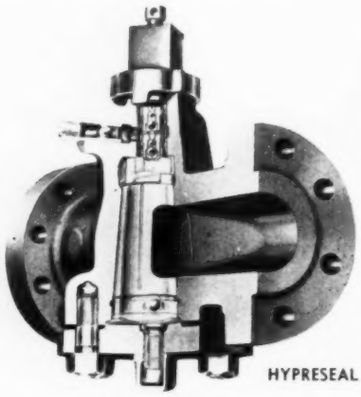
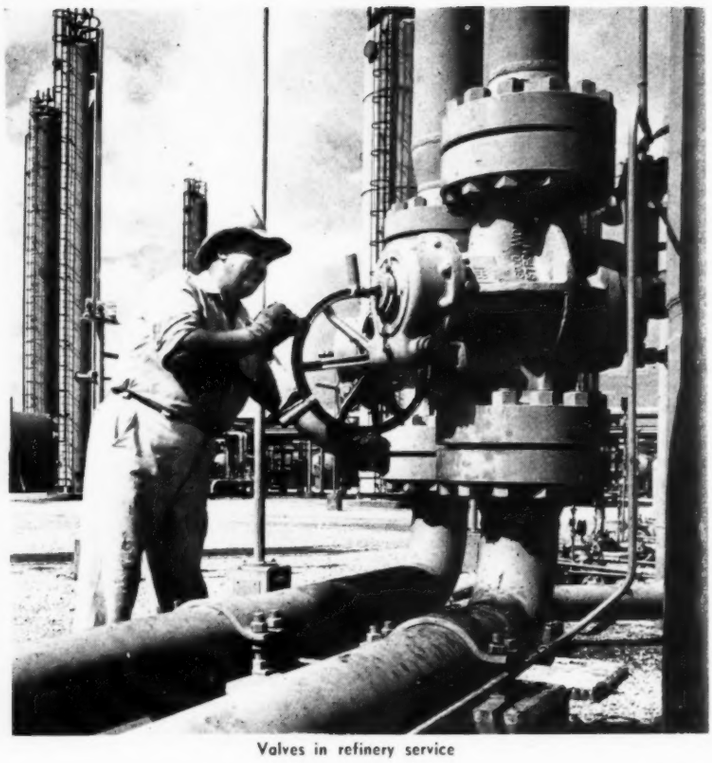
POSITIVE LUBRICANT SEAL

FOR HIGH AND LOW PRESSURE

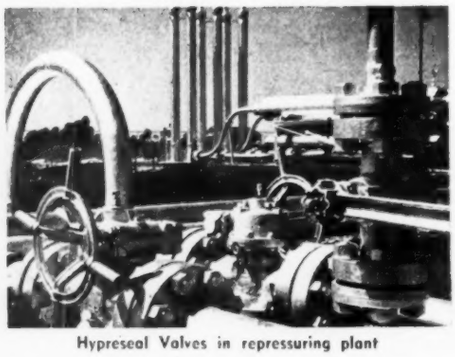
KEEP UPKEEP DOWN



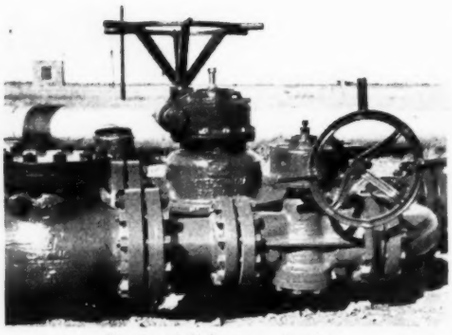
HYPRESEAL



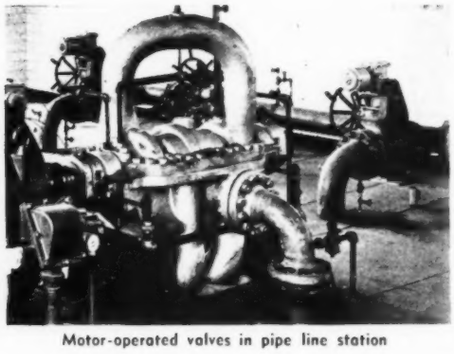
Valves in refinery service



Hypreseal Valves in repressuring plant

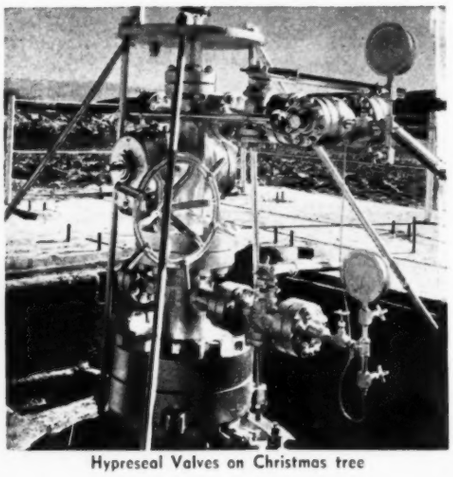


Hypreseal Valves on pipe line

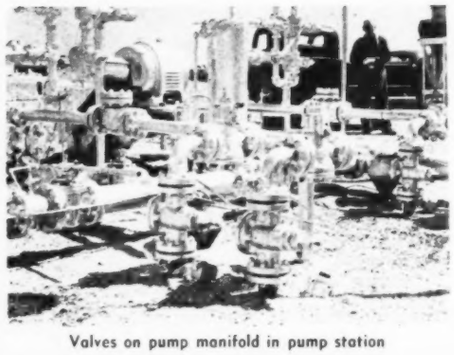


Motor-operated valves in pipe line station

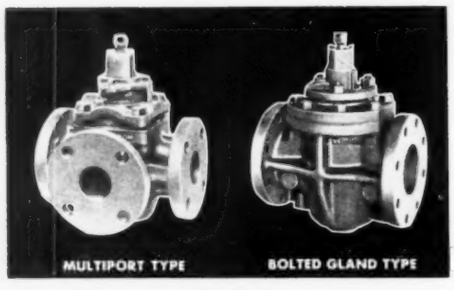
Multiport valves on butane storage tanks



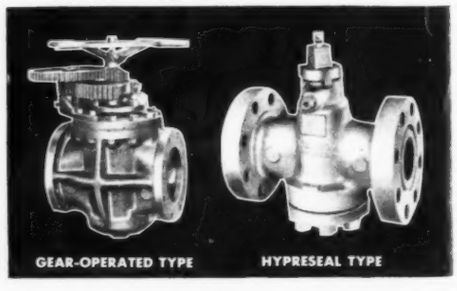
Hypreseal Valves on Christmas tree



Valves on pump manifold in pump station



MULTIPORT TYPE BOLTED GLAND TYPE



GEAR-OPERATED TYPE HYPRESEAL TYPE

AUDLEY ENGINEERING COMPANY, Ltd.

Newport, Shropshire, England

South Africa: Fraser & Chalmers (S.A.) Ltd., Johannesburg. *Australia:* Noyes Bros. (Sydney) Ltd., Sidney. Noyes Bros. (Melbourne) Ltd., Melbourne. C. I. *Mexico:* Fundicion De Fierro De Torreon S. A., Torreon, Coah. *Canada:* Peacock Bros., Ltd., Montreal.

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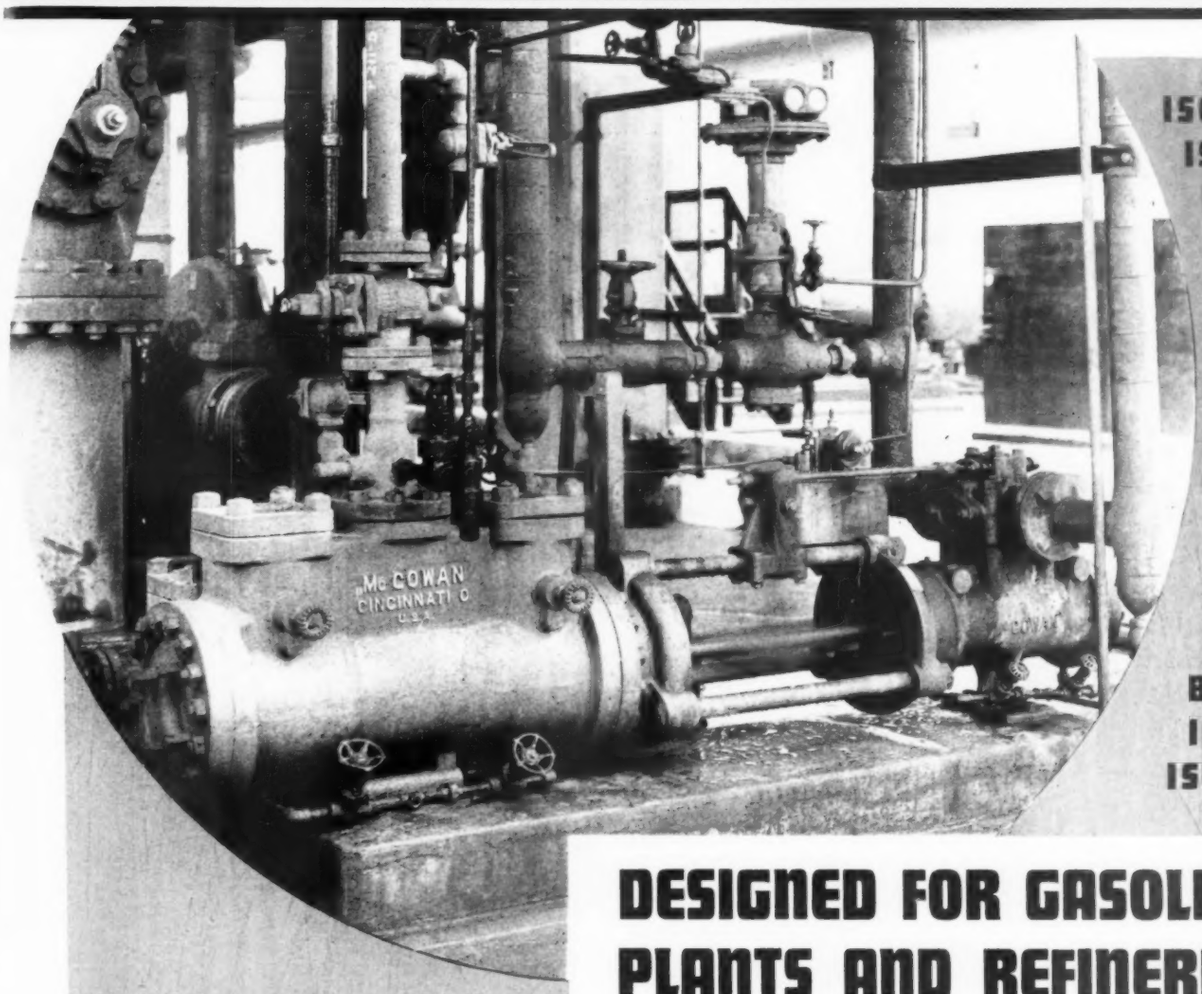
McGOWAN PUMPS *on the job!*



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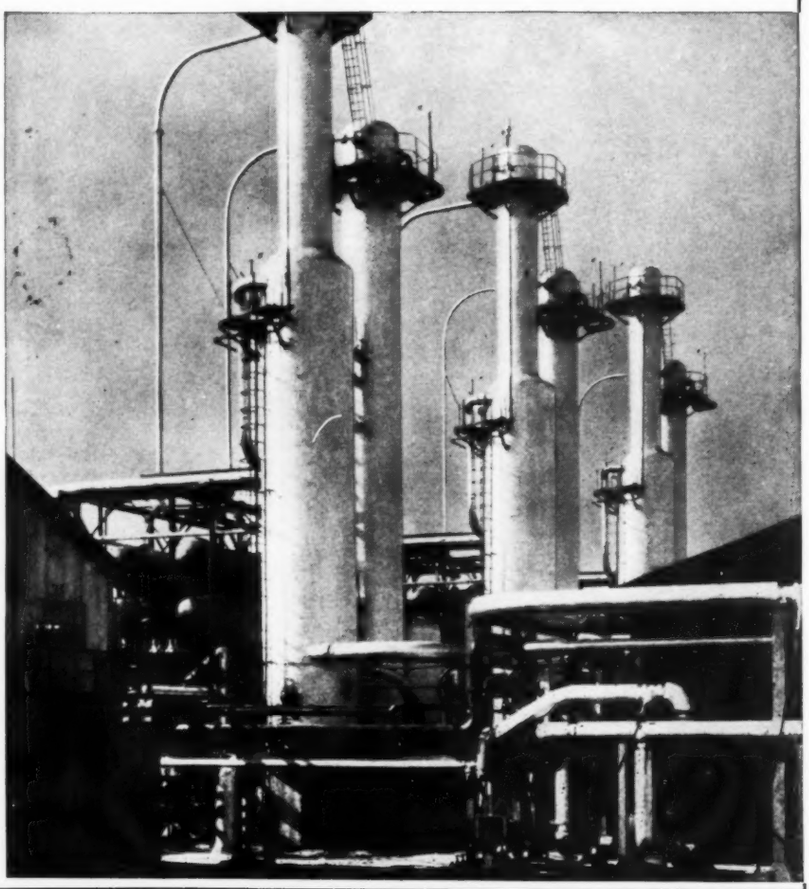
85% Magnesia Insulation

IS EXTENSIVELY USED ON THE CLASS OF WORK ILLUSTRATED. IT HAS AN EXTREMELY LOW THERMAL CONDUCTIVITY, IS LIGHT IN WEIGHT AND WILL MAINTAIN ITS EFFICIENCY THROUGHOUT THE LIFE OF THE PLANT. BEING EASY TO APPLY, ALSO INEXPENSIVE, IT IS IN ALL RESPECTS AN IDEAL COVERING FOR BOILERS, PIPES, HEAT EXCHANGERS, ETC. WRITE FOR OUR CATALOGUE "HEAT INSULATION" WHICH DESCRIBES ALL OUR HEAT INSULATING MATERIALS.



NEWALLS REG'D BRAND PRODUCTS

NEWALLS INSULATION CO. LTD.

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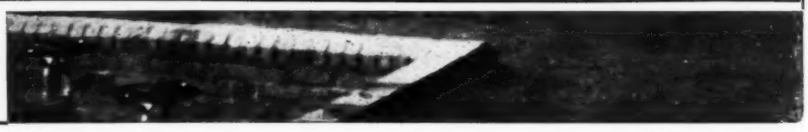

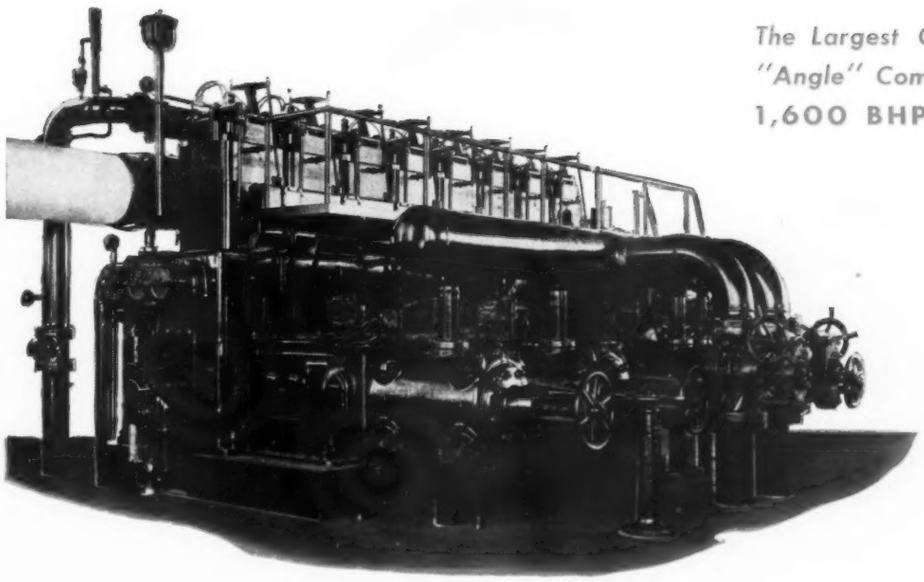

The Largest Gas-Engine-Driven "Angle" Compressor Ever Built
1,600 BHP IN ONE UNIT

NEW CLARK "BA-17"

Super 2-Cycle Compressor

- For high pressure pipeline pumping and large scale pressure maintenance.

Delivers more horsepower per unit of space—and per dollar of cost—than any other gas-engine-driven "Angle" Compressor.

5-Cyl. 1,000 BHP. 6-Cyl. 1,200 BHP. 8-Cyl. 1,600 BHP.

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There's a POWELL VALVE for every Refinery Service

Keeping pace with and even anticipating the amazing progress of the oil refining industry, Powell Engineering has developed a complete line of valves to satisfy the requirements of every flow control service in the refinery of today.

In addition to bronze and iron valves of every necessary type and pressure and all types of steel valves for pressures from 150 to 2500 pounds and temperatures up to 1400 F., Powell Engineers have made a notable contribution to the industry by designing many special valves to solve the problems imposed by new processes and products. A few examples are shown here.

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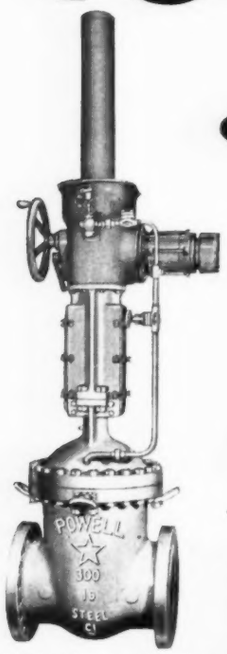
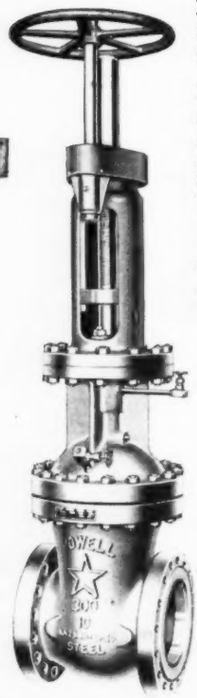


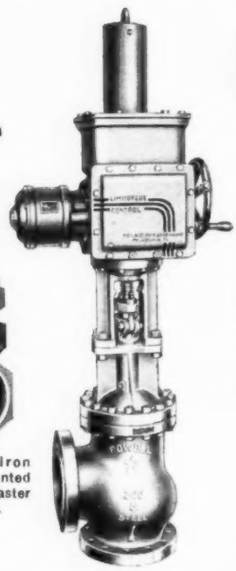
Class 300-pound, 16" Cast Steel Gate Valve designed especially for producing 100 octane aviation gasoline. Has automatic steam sealing mechanism and top mounted electric motor operator.



Class 300-pound, 10" Cast Alloy Steel O. S. & Y. Gate Valve. Spur gear operated. Specially designed and built for ultra-high temperature service. Double wedge discs, seats, disc guides and stem guides are Stellite faced. Cooling fins for dissipating heat and thereby lowering the temperature in the stuffing box are another feature.

200-pound Bronze Gate Valve with renewable disc.

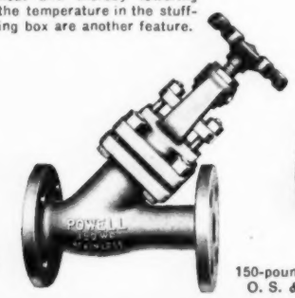
125-150-pound Iron Body Bronze Mounted or All Iron "Master Pilot" Gate Valve.



Class 300-pound Cast Steel O. S. & Y. Angle Valve. Motor operated. Adapted for high temperatures up to 1400 F.

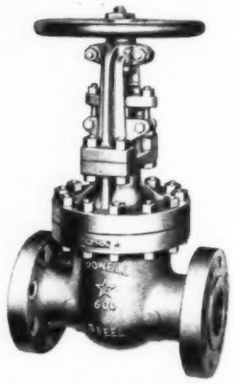
Class 300-pound Cast Alloy Steel Gate Valve, designed to meet special requirements and to handle high temperatures. It has 12" port size venturied to 20" size end flanges to accommodate insulated pipe. Provided with top-mounted, enclosed, explosion proof, electric motor operator for quick, positive opening and closing.

125-pound Iron Body Bronze Mounted or All Iron O. S. & Y. Gate Valve.



150-pound Stainless Steel O. S. & Y. "Y" Valve.

Class 300-pound Cast Steel Swing Check Valve.



Class 600-pound Cast Steel O. S. & Y. Gate Valve. Powell Cast Steel Valves are available in all pressure classes from 150 to 2500 pounds, inclusive.

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STEEL FOR THE WORLD OF TOMORROW

The tougher the going
the greater the need for U·S·S STEELS

WELLS WILL GO DEEPER, drilling will be speeded up refining temperatures will rise even higher as the oil industry enters its coming era of expansion.

During the war UNITED STATES STEEL has carried on a program of research unmatched in the steel industry.

Today U·S·S steels are stronger, tougher, more lasting than ever. They have kept in step with oil's requirements.

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In specifying U·S·S steels for your needs you will unite your knowledge of oil with the skill and unequalled resources of the world's largest steelmaker.

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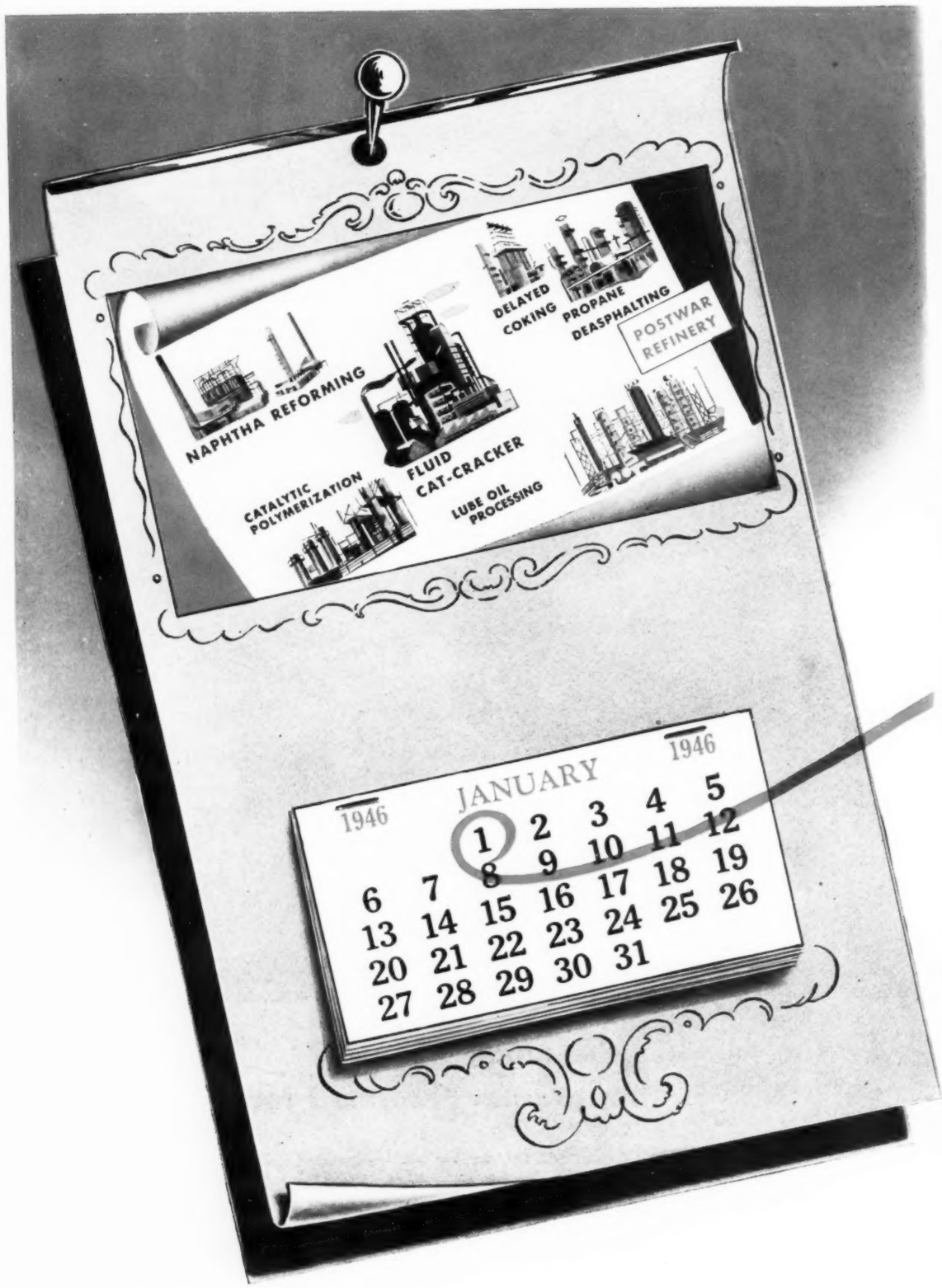
WE SERVE THE WORLD with superior steels from the world's largest steelmaker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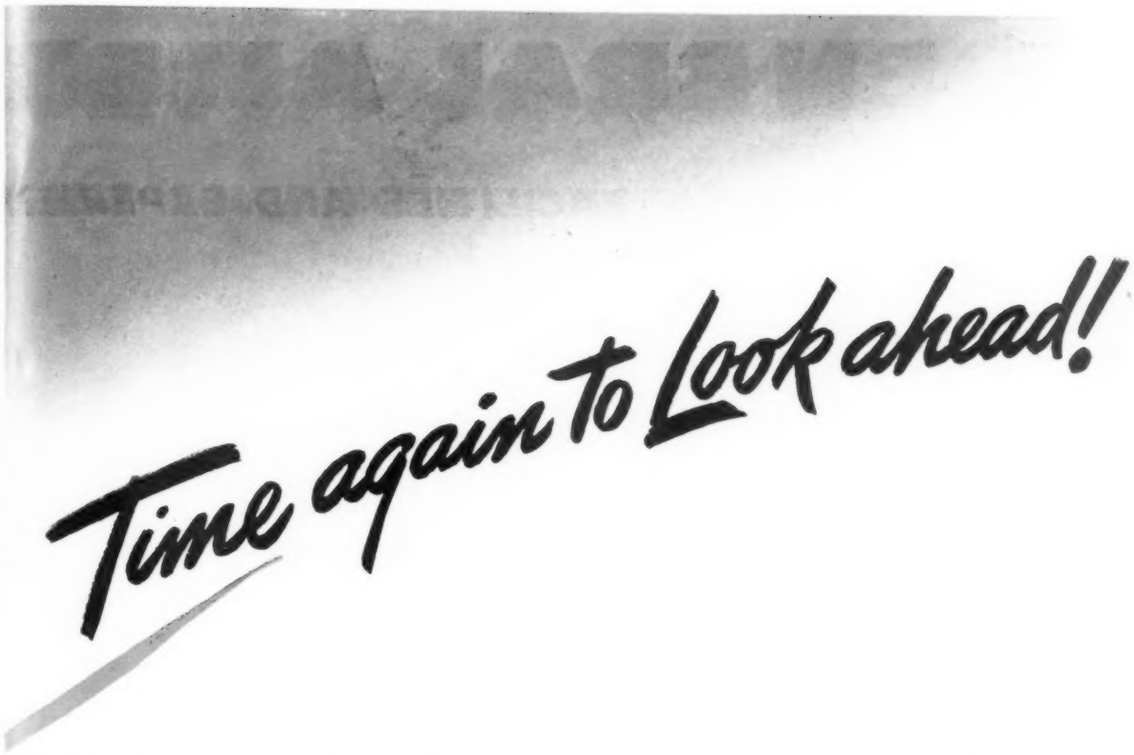

IN ONE SENSE . . . time and calendars have lost their despotic power over the petroleum industry.

Only yesterday the industry annihilated time . . . compressing the technological developments of a pair of decades into months so that the march to victory could be powered with a torrent of high-octane fuels and lubricated with oils equally indifferent to desert sun or arctic cold.

Today, the postwar refinery is more than a set of blueprints locked away in the company safe. Those blueprints are out on the boards . . . being altered to meet competitive conditions of the current market. In many cases, the girders and towers for new installations are already going up.

And tomorrow?

It's no secret that Kellogg process and development engineers are well along with their work on new processes. These projects have merely generic names at the moment . . . natural gas synthesis . . . desulphurization . . . hydrogenation. But they envision the possibilities of a decrease in crude supply; the necessity for more efficient utilization of poorer grade crudes; the future need for higher quality products at lower operating costs.

When you have need for these processes . . . Kellogg aims to be ready.

THE M. W. KELLOGG COMPANY

Engineers and Economists to the Petroleum Refining Industry

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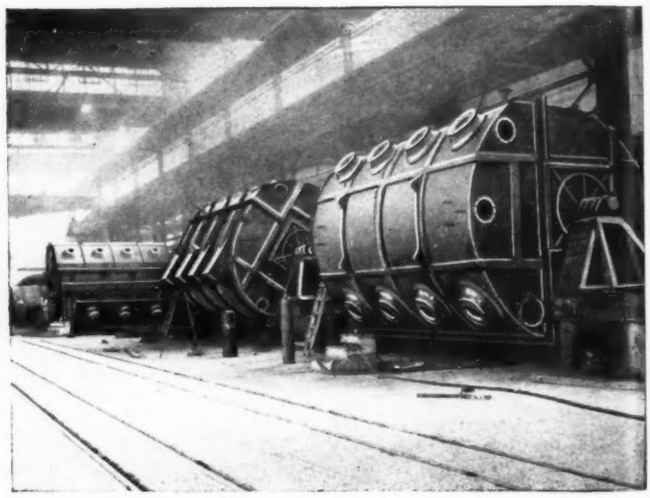
. . . for both dewaxing and product wax recovery are precision built in General American shops to General American standards of better built equipment for superior performance.

The Sharon, Pa. shops not only contain the most up-to-date plate and welding apparatus but specialized equipment which permits the building of large quantities of filter equipment quickly and efficiently. Shipping facilities are excellent as the Sharon plant has direct connections to the New York Central, P. & L. E., Erie and Pennsylvania railroads.



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● *Sales Offices:* Chicago . . . Sharon . . . Louisville . . . Cleveland . . . Pittsburgh ouis .

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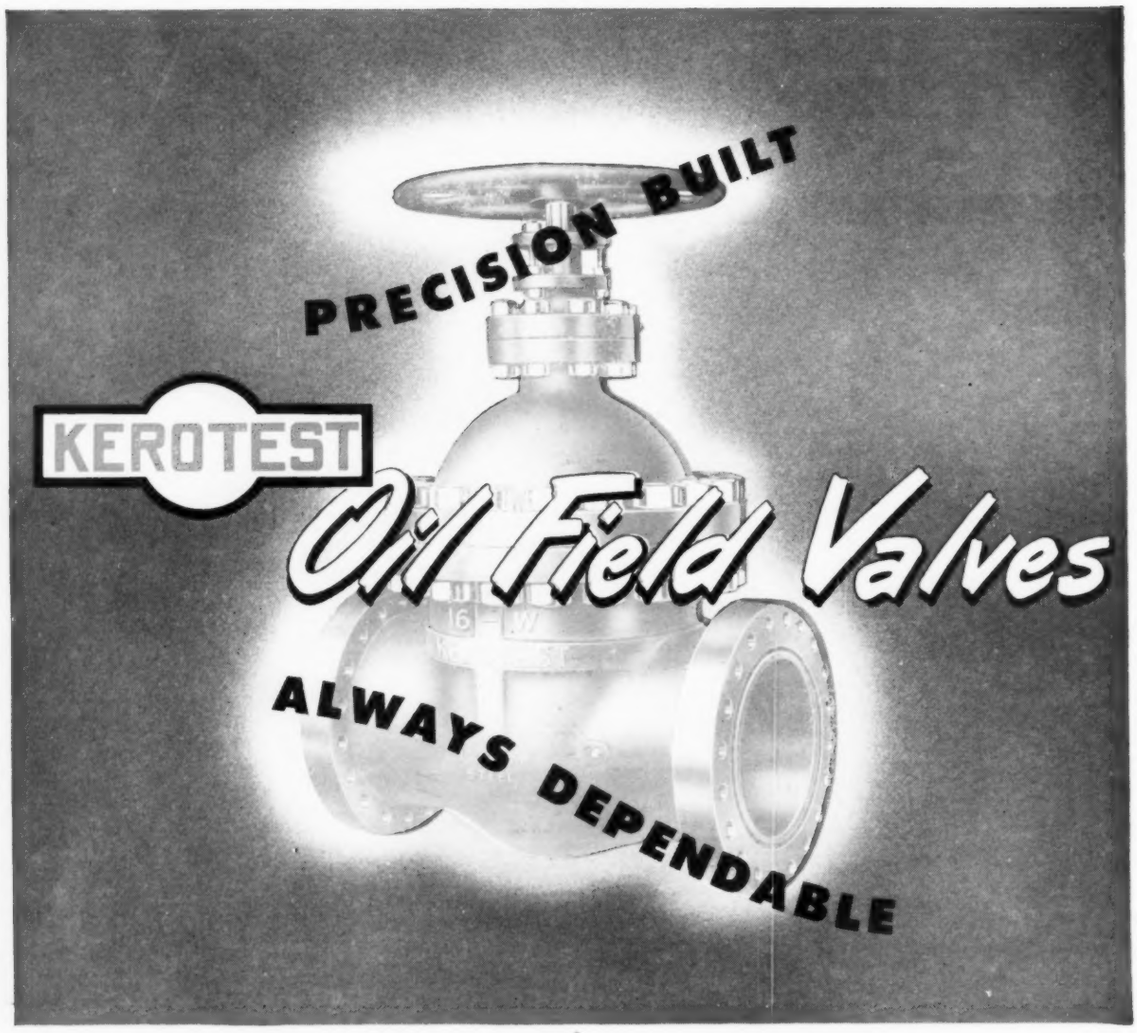

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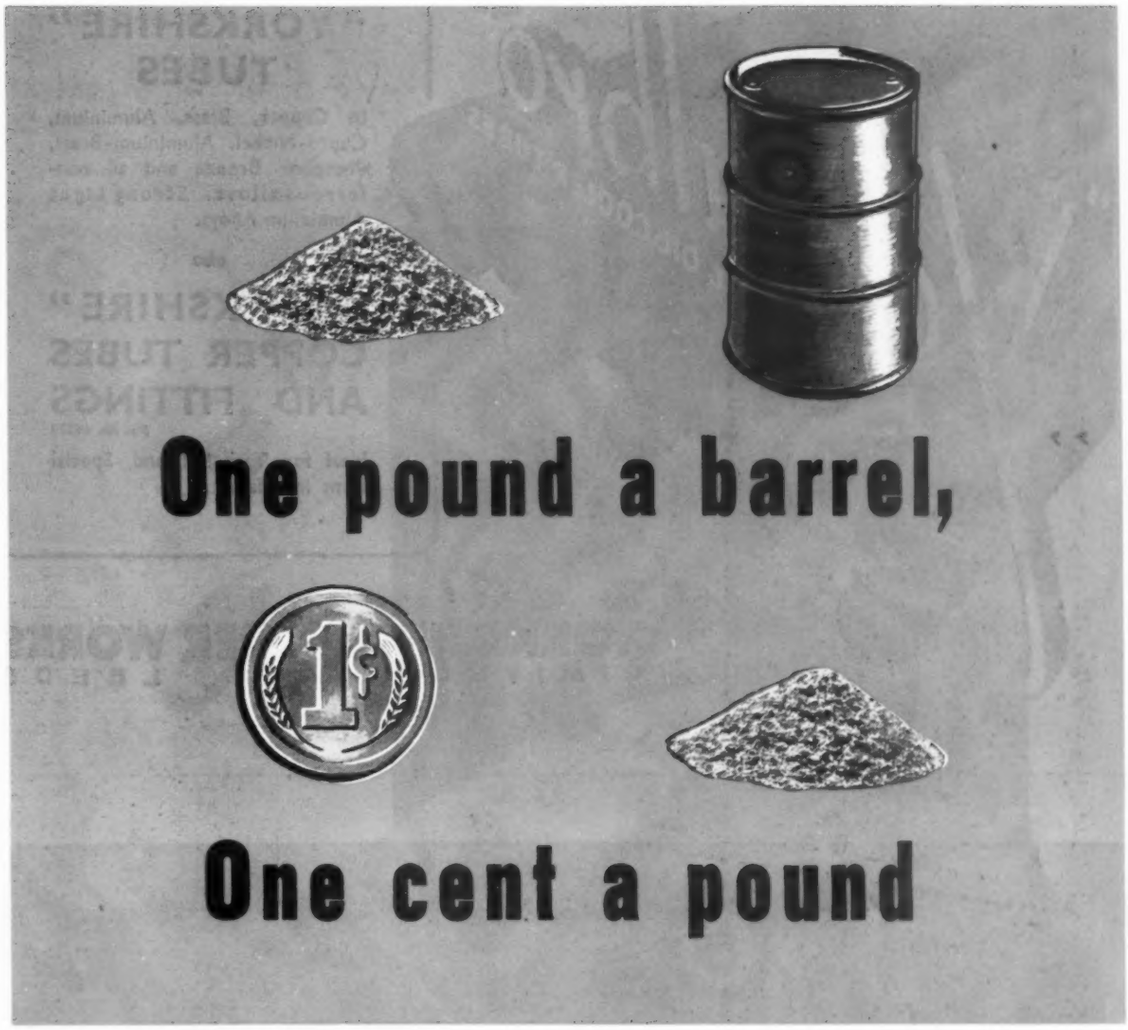

● It's as easy as that to figure the cost of adsorbent when Fullers Earth is used in the percolation finishing of high-quality oil. Fullers Earth can be regenerated and reused time after time. Approximately one pound of fresh adsorbent is needed for each barrel of oil finished—and the cost of percolation grade Fullers Earth runs about a cent a pound. The total cost of finishing oil that has been pre-refined by such modern methods as solvent-deasphaltizing and de-resining is only 12 to 16c a barrel—much less than the cost of adsorbent alone in other clay finishing processes.

Proof of the value of percolation finishing is the fact this low-cost method is chosen for highly refined crystalline waxes and petrolatums, medicinal oils and other petroleum products that must meet the most rigid specifications. Oils finished by this method have better color and oxidation stability, lower carbon residue and better demulsifying characteristics.

Refiners planning to expand their plants or build new ones will want complete facts on modern percolation finishing. Our long experience with the process can be helpful in projecting such plans. The advice and help of our research and engineering staff are available without obligation.

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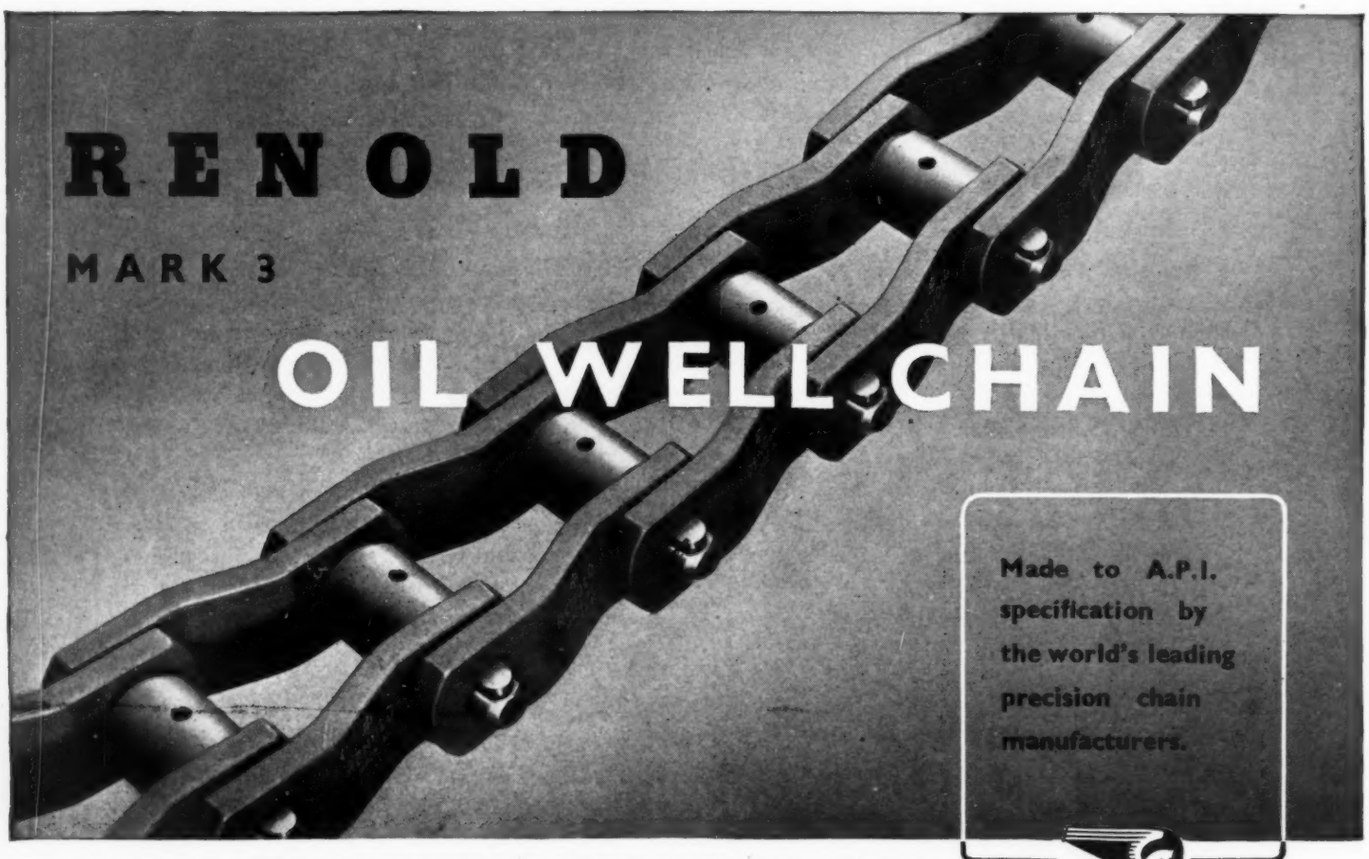

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THE SHARPLES AUTOMATIC Centrifugal CRYSTAL DRIER*

THE SUPER-D-HYDRATOR*

Nearly 6,000,000 pounds of crystals are being dried every day in Sharples Super-D-Hydrators. Although new in design, already this machine is handling a wide variety of crystalline materials.

The Sharples Super-D-Hydrator* is FULLY AUTOMATIC in its operation. Crystals are removed from mother liquor—efficiently washed—spun to near-dryness and discharged without attendant labor. Completely labor-free and trouble-free, THE SUPER-D-HYDRATOR provides a modern answer for the continuous automatic crystal drying problem.

If your material is crystalline, chances are that it can be handled in The Sharples Automatic Centrifugal Crystal Drier.

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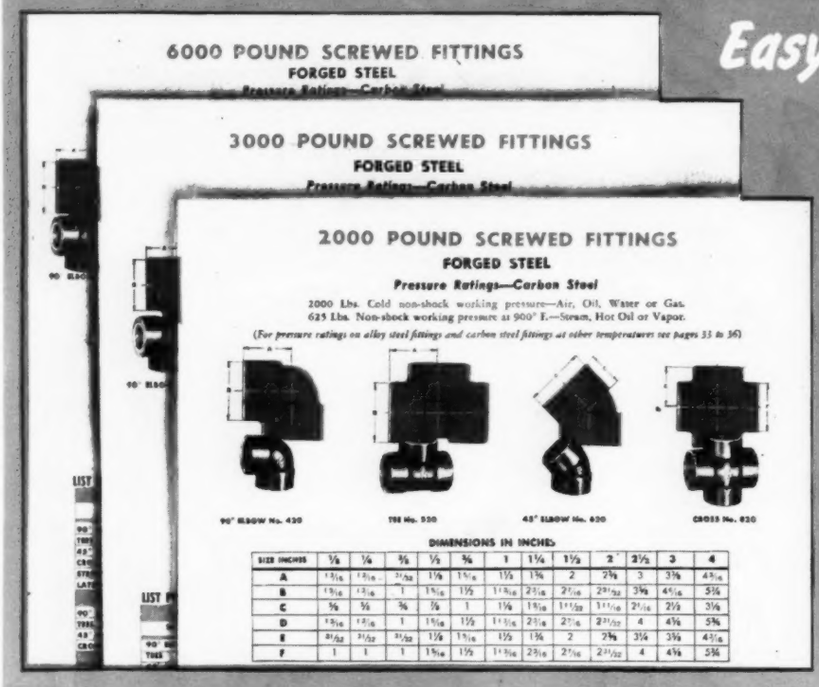
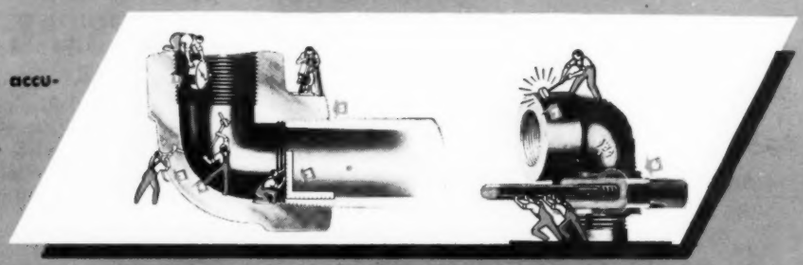
A complete line of Screw End Fittings...
+ Easy Assembly


6000 POUND SCREWED FITTINGS
FORGED STEEL
3000 POUND SCREWED FITTINGS
FORGED STEEL
2000 POUND SCREWED FITTINGS
FORGED STEEL
Pressure Ratings—Carbon Steel
2000 Lbs. Cold non-shock working pressure—Air, Oil, Water or Gas.
625 Lbs. Non-shock working pressure at 900° F.—Steam, Hot Oil or Vapor.
(For pressure ratings on alloy steel fittings and carbon steel fittings at other temperatures see pages 33 to 36)
90° ELBOW No. 430
TEE No. 530
45° ELBOW No. 630
CROSS No. 830
DIMENSIONS IN INCHES

SIZE INCHES	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
A	13/16	13/16	31/32	1 1/8	1 5/16	1 1/2	1 3/4	2	2 1/8	3	3 3/8	4 5/16
B	13/16	13/16	1	1 5/16	1 1/2	1 13/16	2 1/16	2 1/16	2 21/32	3 1/8	4 5/16	5 1/16
C	3/8	1/2	3/8	1/8	1	1 1/8	1 9/16	1 11/32	1 11/16	2 1/16	2 1/2	3 1/8
D	13/16	13/16	1	1 5/16	1 1/2	1 13/16	2 1/16	2 1/16	2 21/32	4	4 1/8	5 1/8
E	31/32	31/32	31/32	1 1/8	1 5/16	1 1/2	1 3/4	2	2 1/8	3 1/4	3 1/8	4 5/16
F	1	1	1	1 5/16	1 1/2	1 13/16	2 1/16	2 1/16	2 21/32	4	4 1/8	5 1/8



1. Threads are long, accurately cut.
2. Perfect alignment.
3. Uniform wall thickness.
4. Unrestricted flow.
5. Controlled chemical and physical properties.
6. Long low bands afford better wrench grip.
7. Rugged — bored from solid drop forgings.

WATSON-STILLMAN Fittings are especially recommended for use on high pressure hydraulic lines and for high pressure, gas, steam and ammonia service.

Elbows, Tees, Laterals and Unions are machined from solid forged steel billets. The materials used for forging stocks are carefully selected for toughness, strength and resistance to temperature and shock.

Threads are long, accurately cut and perfectly aligned to insure tight, leak proof joints. All fittings are chamfered to afford easy assembly.

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Watson-Stillman Co., Roselle, New Jersey.

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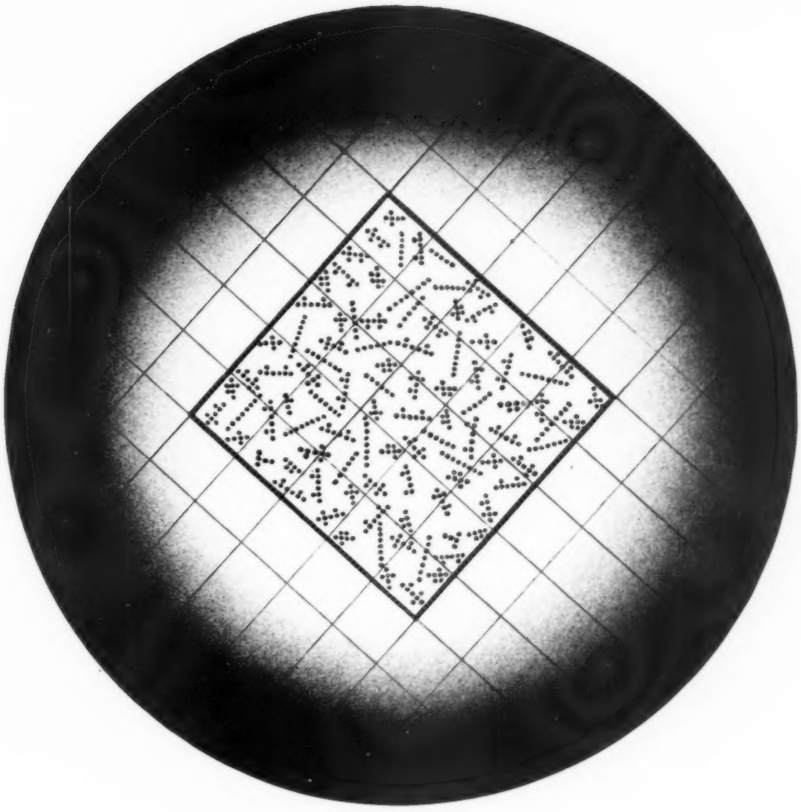

See those Three Molecules with the Yellow (Sulfur) Atom?

THEY'RE MERCAPTANS

They're the ones that destroy the effectiveness of Tetra-Ethyl Lead. Doctor sweetening doesn't take them out. SOLUTIZING Does . . .

REMOVE THEM BY SOLUTIZING

and for the same Octane

T.E.L. REQUIREMENTS MAY BE CUT-IN-HALF

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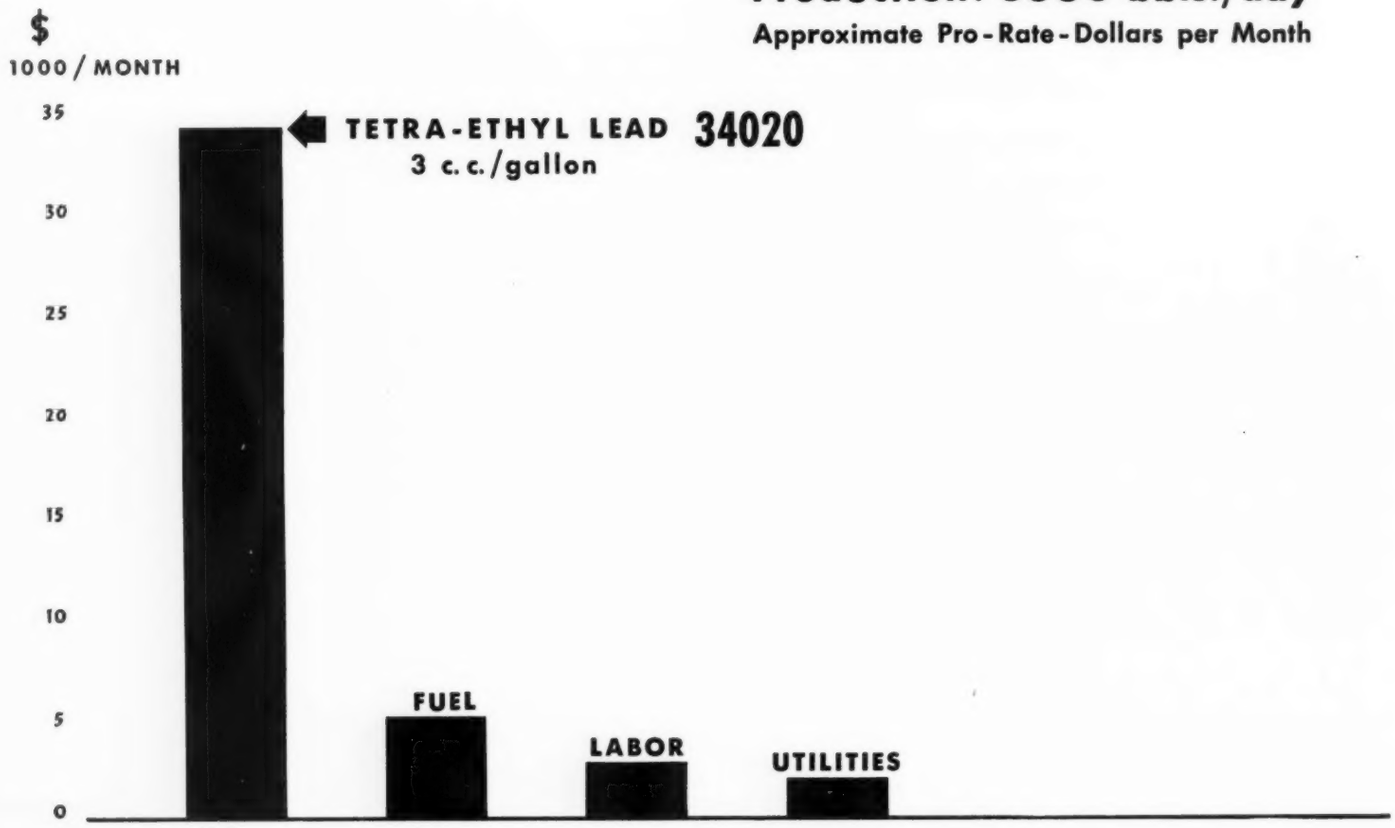
SOLUTIZER PROCESS FOR T.E.L. SAVINGS

FOSTER WHEELER

MFG. COST ANALYSIS MOTOR GASOLINE

Production: 5000 bbls./day

Approximate Pro-Rate-Dollars per Month



BUT ooo there is no approximation, no proration in that cost of $34,020 per month for Tetra-ethyl-lead. That's definite...exact..."out-of-pocket".

One-half of this amount — $17,010 per month — can be saved by SOLUTIZING the sour gasoline.

These are established facts:

1. The malodorous mercaptans must be removed to produce a marketable gasoline.
2. Doctor sweetening merely converts the mercaptans to disulfides which seriously reduce the effectiveness of tetra-ethyl-lead.
3. SOLUTIZING completely removes the mercaptans and significantly reduces the T.E.L. requirements to meet the same Octane specifications.

"Gasoline may be 'Sweet to the Doctor', but Very Sour to the Economist!"

SOLUTIZING PAYS OFF--FAST!

A simple laboratory test of your sour gasoline will disclose approximate T.E.L. savings thru SOLUTIZING. For further information, address

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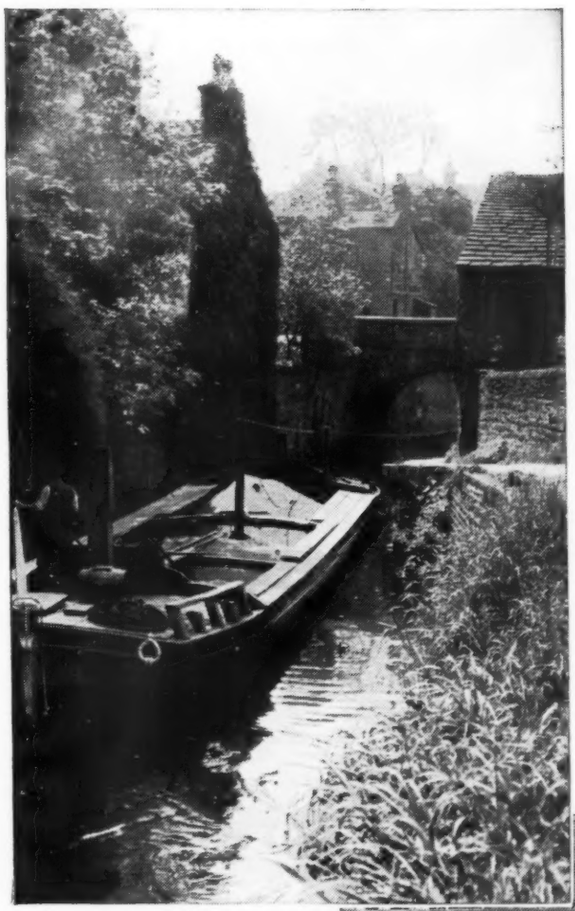

(*Above*) *The Old Canal, Skipton, Yorkshire. One of the W. P. Butterfield series of Yorkshire scenes.*

(*Below*) *1500 gallon 3-compartment Tank for carrying light oils.*

HEAD OFFICE & WORKS, SHIPLEY, YORKSHIRE, ENGLAND.

'One-horse' transport, or Horsemanship

THE barge-horse, with a fitting sense of the symbolic, has disappeared from the picture and, because his days of towpath drudgery are practically over, thanks to the powerful intervention of the diesel-driven barge, has metaphorically *and* literally 'turned the corner.'

Add the fact that British farming is now the most highly mechanized in the world; that oil-fired locos are now running on British railways and it becomes obvious that the distribution of Petrol and Oil in Britain — already a key industry — is attaining ever-greater importance.

Butterfield Road Transport Tanks embody over 60 years' experience in tank construction. The principal distributors rely on them to do their job supremely well, not merely in Britain, but in all parts of the world.

Butterfields
ENGINEERS • SHIPLEY
Builders of Tanks for 60 Years
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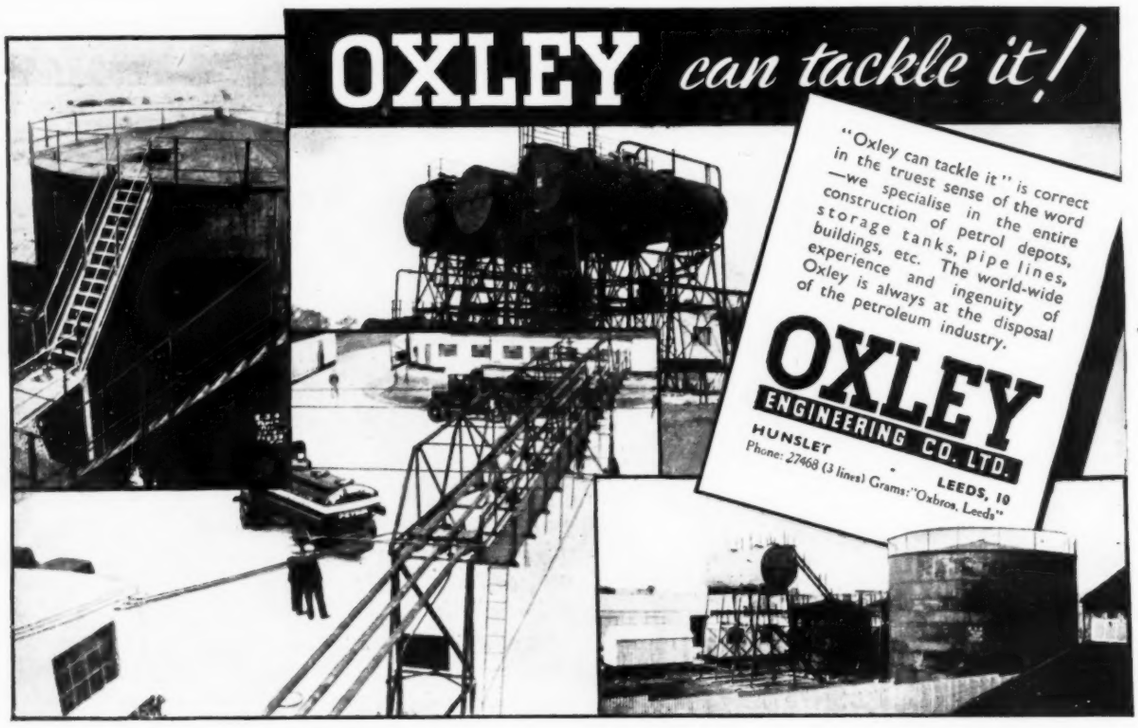
BUTTERFIELD

Road Transport Tanks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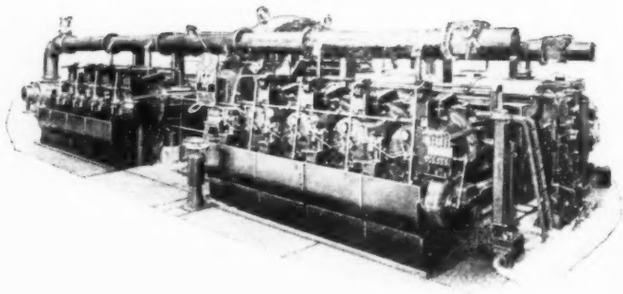

A 2,600 B.H.P. Crossley-Premier pressure-charged 16 cylinder oil engine convertible to work on Blast Furnace Gas

This engine, the largest horizontal Oil Engine working in this country, is installed in one of several large works of a steel firm in the Midlands having twenty Crossley-Premier engines in use. At present running on oil, it is designed to operate also on Blast Furnace Gas.
Present running conditions are particularly arduous, involving non-stop working from Monday morning until Saturday noon under heavy load. The Crossley-Premier engine is specially designed for such heavy duty, its slow speed and exceptionally robust construction ensure continuous and reliable performance.

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SIZES up to 3,000 B.H.P.

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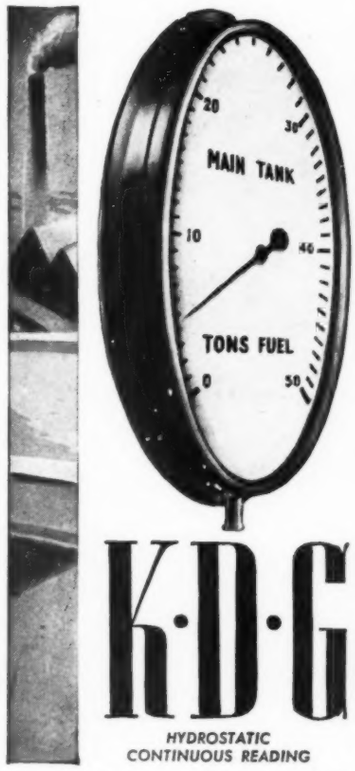

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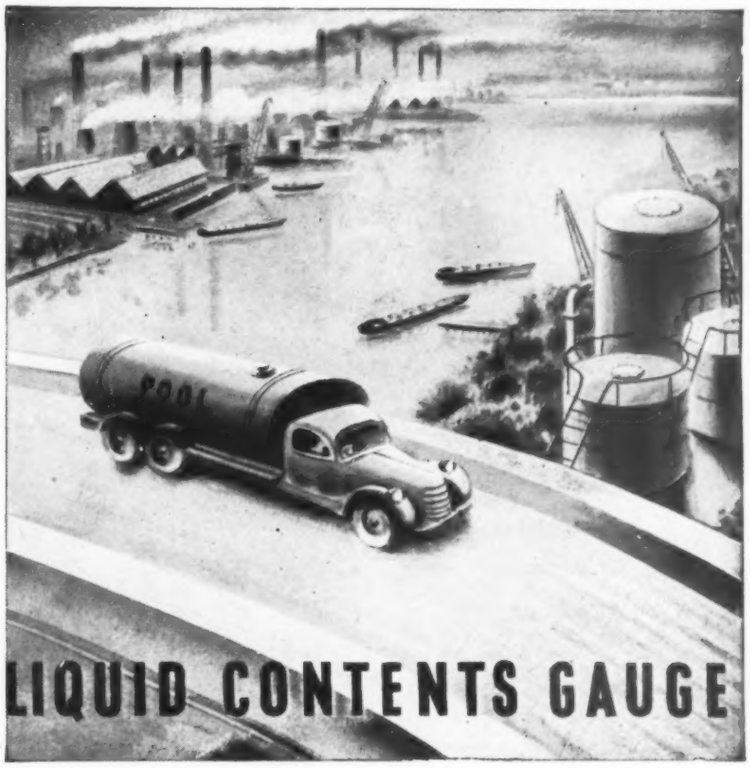

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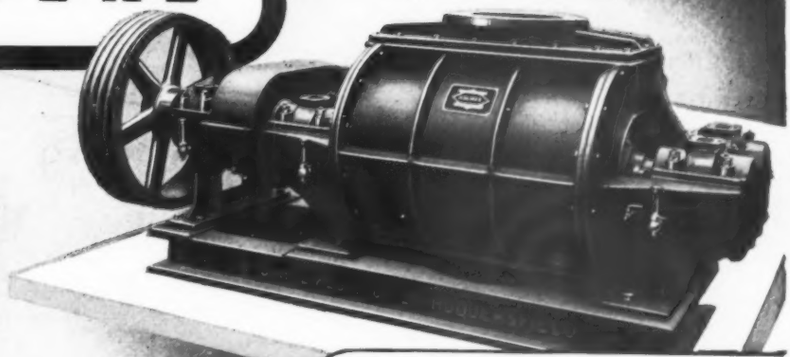

These machines deliver a positive, reliable and oil-free supply of air, economically and efficiently. Absence of internal contact ensures long life, low maintenance costs and continuous operation over long periods.

It is also extensively used for Gas Exhausting or Boosting and over 1,400 machines have been supplied for these purposes.

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MIDLANDS OFFICE. 21 BENNETT'S HILL, BIRMINGHAM, 2

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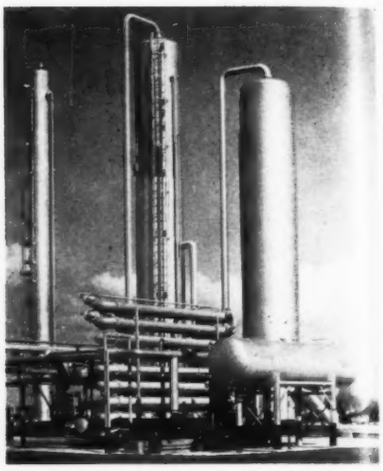
Natural Gasoline and Refining Equipment

Fractionating Column — 78 inches x 80 feet, 10 inches



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FACILITIES & EQUIPMENT TO *Build RIGHT!*

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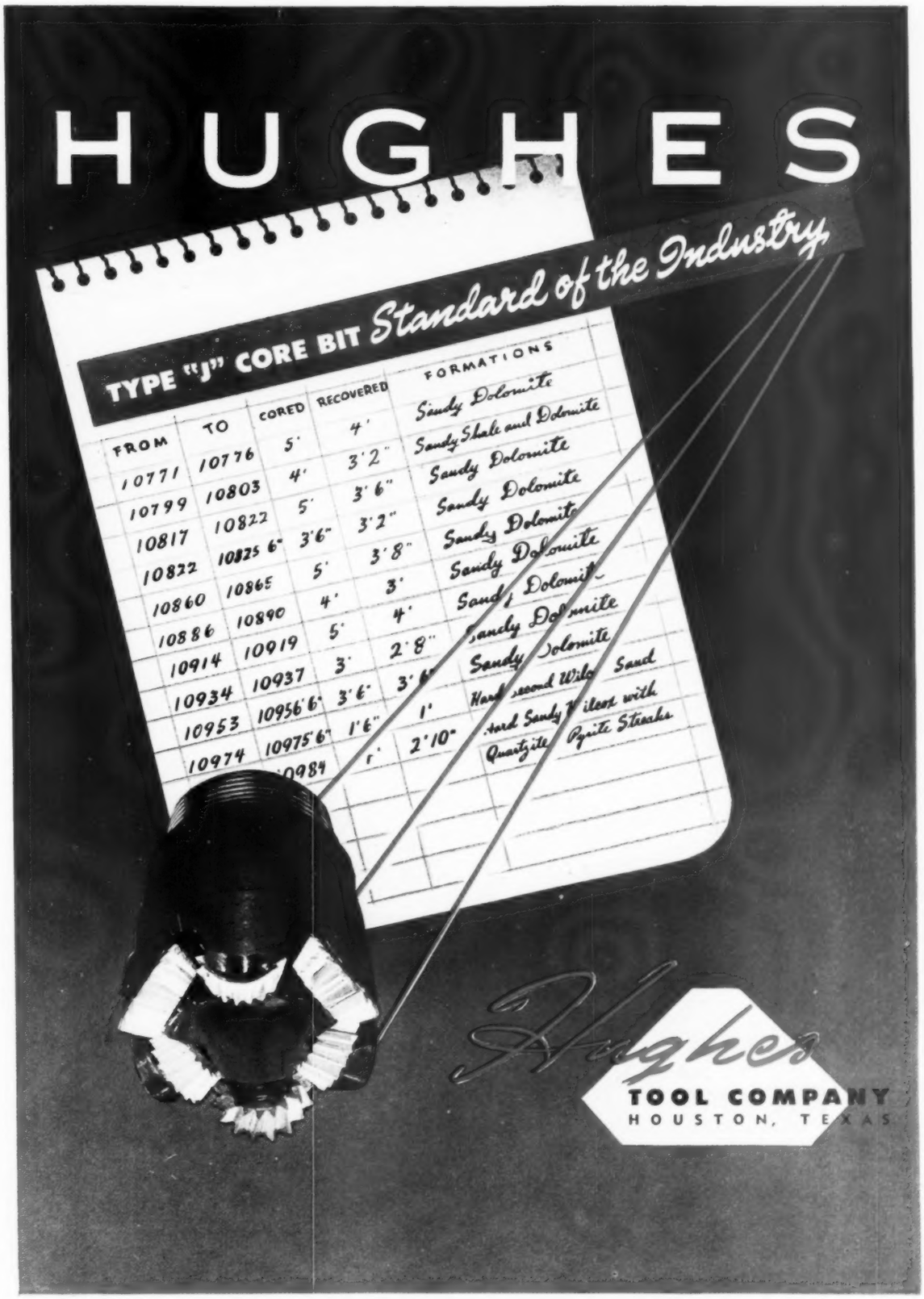
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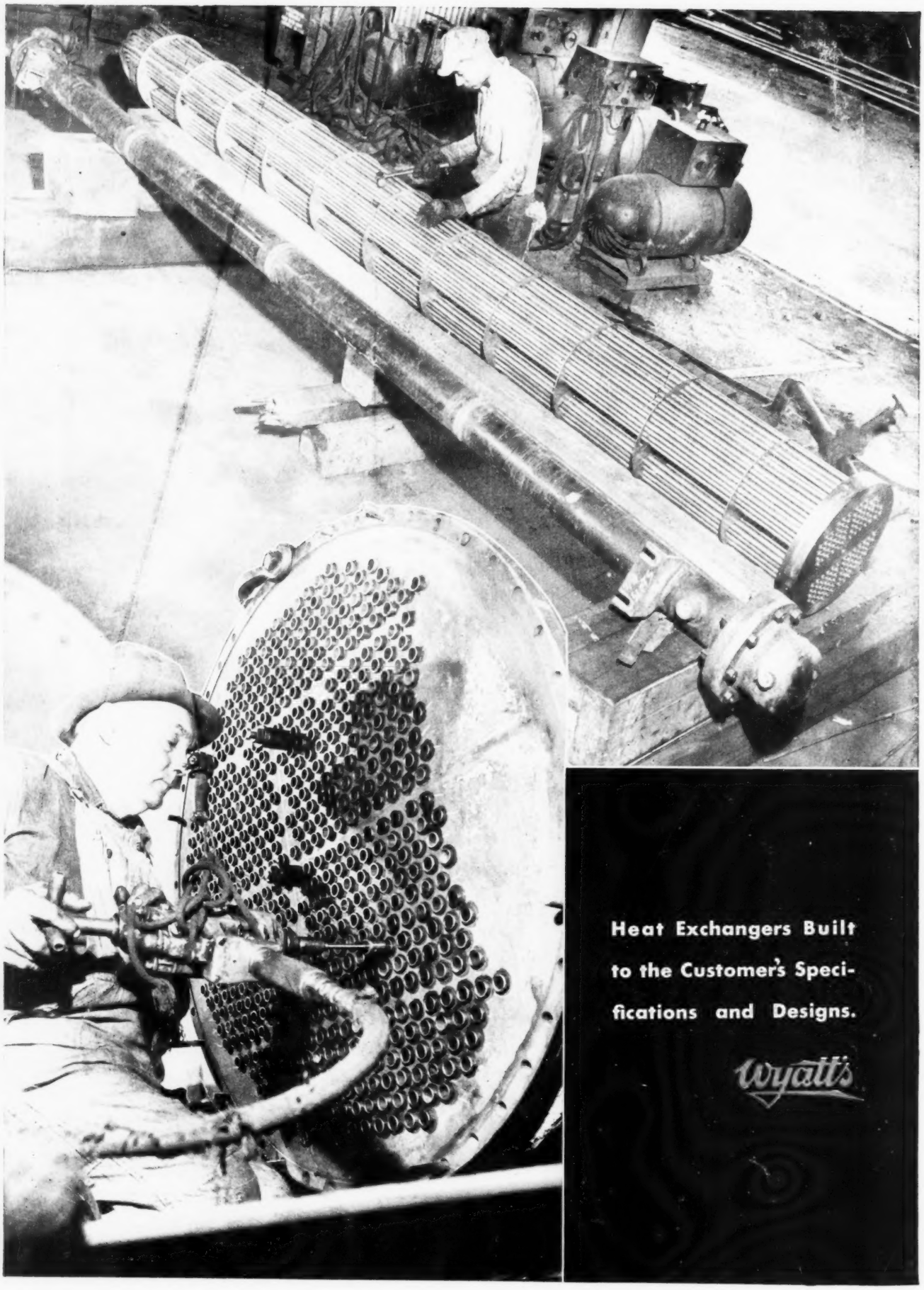

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